

The Allen Consulting Group

Productivity Commission Review of Airport Pricing

Issues arising from the Draft Report

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Report to Virgin Blue

The Allen Consulting Group

The Allen Consulting Group Pty Ltd
ACN 007 061 930

Melbourne

4th Floor, 128 Exhibition St
Melbourne VIC 3000
Telephone: (61-3) 9654 3800
Facsimile: (61-3) 9654 6363

Sydney

Level 12, 210 George St
Sydney NSW 2000
Telephone: (61-2) 9247 2466
Facsimile: (61-2) 9247 2455

Canberra

Level 12, 15 London Circuit
Canberra ACT 2600
GPO Box 418, Canberra ACT 2601
Telephone: (61-2) 6230 0185
Facsimile: (61-2) 6230 0149

Perth

Level 21, 44 St George's Tce
Perth WA 6000
Telephone: (61-8) 9221 9911
Facsimile: (61-8) 9221 9922

Brisbane

Level 9, 379 Queen St
Brisbane QLD 4000
PO Box 7034, Riverside Centre, Brisbane QLD 4001
Telephone: (61-7) 3221 7266
Facsimile: (61-7) 3221 7255

Online

Email: info@allenconsult.com.au
Website: www.allenconsult.com.au

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Chapter 1

Introduction and Overview

The Allen Consulting Group has been asked by Virgin Blue to advise on four matters arising from the Productivity Commission's Draft Report for its Review of Price Regulation of Airport Services, namely:

- whether the Commission's view that price increases at airports since the cessation of formal price control can be considered justifiable, on the basis of the empirical evidence;
- related to the first matter, whether the Commission's proposed approach to the valuation of the airports' aeronautical assets – namely to 'lock-in' the values that have been recorded for these assets in the airports' regulatory accounts as at 30 June 2005 (but preclude any revaluation thereafter) – is appropriate;
- whether the Commission's observations that the asset beta for the Australian airports is likely to have risen are correct; and
- whether the Commission's assumption that the decision over the initial asset value for the airports' aeronautical assets raises only distributional issues (rather than efficiency issues) is correct, including whether the Commission was justified in assuming that the airlines would not pass on increases in airport charges.

A summary of our views on these matters is as follows.

- *Justification for price increases* – our previous report for Virgin Blue set out a detailed empirical analysis of whether the pricing decisions of the airports since the removal of price control can be considered justifiable,¹ in the terms of the Government Review Principles. The conclusion of this analysis was that the increase in the airlines' prices (and revenue) since the removal of price control exceeds the amount that can be explained by cost increases or the 'demand shock' arising from the fall of Ansett and September 11, and hence cannot be considered to be justifiable. We note that the Productivity Commission's conclusions appear based merely on an acceptance of statements contained in submissions from the airports – it has not undertaken any empirical analysis to justify its conclusions, nor identified any weakness in the analysis that we presented.
- *Setting the initial asset value* – we agree with the Commission's conclusion that an asset value should be locked-in for the airports' aeronautical assets and that further revaluation thereafter should be precluded, as well as its acceptance of the argument that economic principles do not provide a rationale for revaluing these assets (including land). However, the Commission's choice of starting point for the value of the airports' aeronautical assets (the regulatory book value as at 30 June 2005) will sanction price increases since the removal of price control that cannot be justified by increases in cost or shocks to demand.

¹ Allen Consulting Group 2006, *Productivity Commission Review of Airport Pricing - Behaviour of the Airports Since Removal of Price Control and Compliance with Review Principles 1 and 3*, Report for Virgin Blue, July.

The method for setting the initial asset value that is consistent with the Government's Review Principles is the value that was implied by the price controls that previously existed (which, for Sydney Airport, is the value determined by the ACCC). By adopting this value, the airports would be permitted to set prices necessary to recover all costs incurred, and that permits the airports to respond to demand shocks, but not to raise prices merely due to an arbitrary revaluation of their assets.

- *Asset beta for aeronautical services* – the Commission's observations that the asset beta for aeronautical services may have increased over recent years is not based on an analysis of a full range of the factors that may affect asset betas, noting that only the risk that cannot be removed by holding a well-diversified portfolio of assets is relevant in this regard. Moreover, intuition is of limited use when determining asset betas – even if the full range of matters that may affect asset betas can be identified (which can never be known), the effect of each of those factors, and hence the net implications for the asset beta, can only be guessed. Rather, the only robust means to derive an asset beta for any asset is to examine the available empirical evidence. Our preliminary analysis of this evidence does not provide any basis for assuming that the asset betas the ACCC previously applied to airports were understated (rather, the reverse is more likely).
- *Distributional or efficiency effects from valuation?* – if changes to airport prices flow through to airfares, then welfare effects should be expected from an increase in airport prices, as the wedge between price and the marginal cost of flying and landing another passenger would increase. Moreover, the Productivity Commission's implicit view that an increase in airport charges would be borne by the airlines and not passed on cannot be justified by economic principles – even a pure monopoly would be expected to pass through half of any increase in marginal cost into final prices (assuming a linear demand curve), with a Cournot duopolist expected to pass-through two-thirds of any increase in short run marginal cost (assuming a linear demand curve), and a firm in a market that is subject to perfect competition or characterised by a Bertrand strategic behaviour would be expected to pass increases in short run marginal cost fully into final prices.

We summarise the results that were generated by Professor Tae Oum in a statement to the Australian Competition Tribunal (a copy of which, we understand, has been provided to the Commission on a confidential basis). Professor Oum's analysis suggested that a 100 per cent increase in Sydney Airport's landing charges (from about \$3 per passenger to \$6 per passenger)² would dissuade (inefficiently) about * passengers from flying to Sydney per annum under his most plausible assumption about the extent of competition between the airlines, which cannot be considered an immaterial welfare effect.

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² Professor Oum considered only the effects of an increase in landing charges, which account for approximately \$3 of the \$11 per passenger that Sydney Airport receives from all aeronautical services. Accordingly, a doubling of aeronautical charges is equivalent to an increase in aeronautical charges of approximately 27 per cent.

Chapter 2

Are Current Price Levels Justifiable?

2.1 The Productivity Commission's conclusions

The Commission has made a number of observations to the effect that the price or revenue increases that have been observed since the removal of price control regulation would appear to be justifiable.³ By way of example, the Productivity Commission observes that:⁴

These increases were widely accepted as being necessary, including by the government, to put the provision of aeronautical services at these airports on a commercial footing. In particular, low or often negative rates of return on the provision of these services under the price cap regime... had failed to provide funds to refurbish and upgrade infrastructure, leading to a growing 'investment gap.'

The Commission also refers to 'underpricing of services'⁵ and 'commercially unsustainable' charges, in reference to this period.⁶ It further observed that:

Since this initial realignment of charges, subsequent increases have generally been more modest, and been partly to pay for additional new investments... and security upgrades.

However, the Commission has not presented any empirical analysis to support its apparent view that the price increases since the removal of price control can be considered to be justifiable, and nor has it set out its analysis as to how it has quantified or even defined the concept of 'underpricing' or how it has calculated the extent to which the previous charges may have been 'commercially unsustainable'.

There is no *a priori* reason for the Commission to conclude that the price and revenue increases since the removal of price control can be considered to be justifiable.

- Services can only be considered to be 'underpriced' or commercially unsustainable if revenue is not permitted to rise to recover the additional cost incurred in financing *new* investments or from meeting *new* obligations, which is an empirical issue. For revenue increases to be justifiable even if costs have not increased, there must be a view that the return being earned on past investments is inappropriate – however, given that the airports' primary assets are 'sunk' there is no obvious reason that an increase in the return on sunk assets is required.
- To the extent that one-time price increases in 2001-02 and 2002-03 reflected temporary demand shocks resulting from September 11 and the collapse of Ansett, these should have been reversed as traffic recovered — and they have not been.

³ For the avoidance of doubt, we characterise a change in basis for charging from a slow growing measure of output (i.e. maximum take-off weight) to a fast growing measure of output (i.e. passenger numbers) as an increase in the price.

⁴ Productivity Commission 2006, *Review of Price Regulation of Airport Services*, Draft Report, Canberra, pp. 14–15.

⁵ *Ibid.*, p. 15

⁶ *Ibid.*, p. 16

- Although increases from 2002-03 onwards may have been ‘modest’, strong passenger growth in this period should have led to price *decreases*, as fixed costs were spread over a greater volume. Given this, even ‘modest’ price increases are consistent with revenue substantially in excess of costs.

In contrast, our previous report presented an empirical analysis of how the increases in the airlines’ revenues have tracked against the change in costs since the removal of price control. The clear conclusion from that empirical analysis was that, for all airports, revenue since the removal of price control has risen substantially more than is justified by the increase in cost or any external shocks. This evidence strongly refutes any hypothesis the Commission may have that the current price levels (and revenue increases thereby implied) can be considered to be justifiable.

These matters are discussed in more detail below.

2.2 Intuition behind the price increases

It is not clear that services were overpriced

The Commission’s view that airport services were ‘underpriced’ and ‘commercially unsustainable’ does not have a clear basis in economic theory. Services can only be considered to be ‘underpriced’ or commercially unsustainable if revenue is not permitted to rise to recover the additional cost incurred in financing *new* investments or from meeting *new* obligations, which is an empirical issue.

For revenue increases to be justifiable even if costs have not increased, one must adopt the view that the return being earned on past investments is inappropriate (as it appears the commission does).⁷ However, as the Commission itself acknowledges, measured returns are ‘critically dependent’ on the assumed value of sunk assets,⁸ and there is no obvious reason in economic theory that an increase in the return on sunk assets is required.

Despite concluding that airport assets are largely sunk, and accepting the view that the value ascribed to sunk assets is somewhat arbitrary,⁹ the Commission nevertheless dismisses all of the substantial price increases over 2001-02 and 2002-03 as an ‘initial realignment’ to reported book values, with no further analysis of whether this ‘realignment’ was actually justified on efficiency grounds.

Prices have not decreased, despite strong traffic growth

The Commission notes that increases subsequent to 2002-03 ‘have generally been more modest...’,¹⁰ and suggests that that these increases are partly explained by additional costs. The implication is that because increases were ‘modest’ they cannot be a reflection of market power and should not be cause for regulatory interest.

⁷ Ibid., p. 22.

⁸ Ibid., p. 23.

⁹ Ibid., p. 95.

¹⁰ Ibid., p. 16.

This intuition is misleading. The ‘modest’ gains presented by the Commission in Table 2.2 of the Draft Report are specified in terms of revenue per passenger. With largely fixed costs, and strongly growing passenger traffic (above 10 per cent nationally in 2003-04 and 2004-05¹¹), for an airport’s charges to continue to be justified by cost, per passenger revenue should fall (absent substantial new investment) as airports are able to spread fixed costs over a greater volume. The fact that revenue per passenger in fact grew in this period – rather than falling substantially – should lead the Commission to the counter view, that market power in fact is being exercised. Without a proper analysis of revenue compared with costs, which is absent from the Draft Report, it is difficult to accept the conclusion that price and profit outcomes have been in any way reasonable over the monitoring period. Indeed, our own analysis, reported previously, provides empirical evidence that the opposite is true.

Lastly, we note that the Commission has noted that traffic growth is expected to provide ‘downward pressure’ on prices in future.¹² The discussion above should be taken to imply that traffic growth will provide the *scope* for price reductions (indeed, substantial one-off reductions and then an ongoing reduction if per-passenger charges are to continue). However, this does not imply that there will be any *pressure* for this surplus to be passed on through lower prices – in any market, the extent of pressure for pricing to be contained depends on the extent of competition and/or the effectiveness of the regulatory regime. Absent competition or an effective regulatory regime, a surplus that accrues from increasing sales while costs remain fixed would be expected to be retained by the service provider – as it has by the airports in the period since the removal of price control.

2.3 Empirical evidence: price increases have not been justified by cost

Our previous report set out the results of an empirical assessment of how the airports’ revenues have tracked against costs in the period since the removal of price control,¹³ drawing on the information that is contained in the ACCC’s monitoring reports as well as the ACCC’s 2001 decision on Sydney Airport’s aeronautical charges.¹⁴ The method we employed was to compute a level of cost (labelled ‘long run cost’) that comprised:

- a ‘return on’ and ‘return of’ past investments that was consistent with that earned under the previous price control regime;

¹¹ Bureau of Transport and Regional Economics 2006, Airport Traffic Data 1994-95 to 2004-05, http://www.btre.gov.au/statistics/xls/atd_2004_05.xls.

¹² Productivity Commission, op. cit., p. 25

¹³ Allen Consulting Group 2006, *Productivity Commission Review of Airport Pricing - Behaviour of the Airports Since Removal of Price Control and Compliance with Review Principles 1 and 3*, Report for Virgin Blue, July, Chapter 5.

¹⁴ We have drawn upon the *information* that has been presented in the ACCC monitoring reports, but not the *analysis* that is presented therein. Many of the measures of cost or profit that are reported by the ACCC are influenced materially by how the airports have chosen to value their airport assets, for which substantial discretion would appear to reside with the airports. In order to rely upon any measure of financial performance to draw inferences about the behaviour of the airports, it is essential that the airport assets be valued appropriately. Hence we do not consider that many of the measures of cost or profit that are reported by the ACCC in its monitoring reports to permit reliable inferences to be drawn.

We also note that there are gaps in the information published by the ACCC, as well as concerns expressed by the ACCC about the quality of the data received and the compliance of the airports with their current reporting requirements. Our approaches for overcoming the gaps in the information provided and comments on the quality of the data are described in Chapter 5 of our earlier report. We do not consider that these gaps or questions of quality affect the conclusions reached in this report.

- the cost of financing new investments (i.e. a 'return on' and 'return of' this investment); and
- operating expenses incurred, including any expenses incurred to meet new obligations (such as new security requirements).

This 'long run cost' was then compared to the revenue that the airports actually earned from aeronautical services. In this way, if revenue tracked long run costs over time, then it could be concluded that:

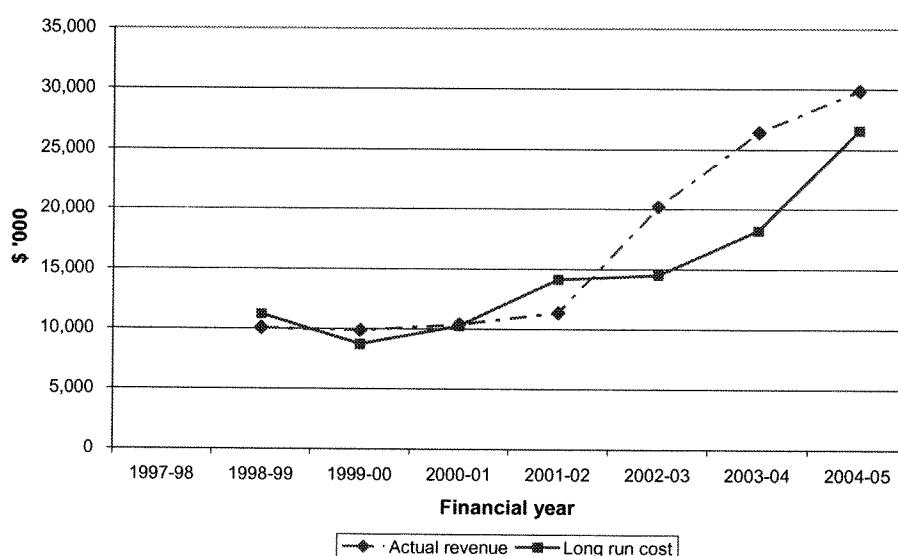
- revenue had risen as necessary to accommodate the cost of new investments;
- revenue had also risen as necessary to accommodate the cost of meeting any new obligations;
- prices had been changed as necessary to retain revenue in the face of external shocks (but changed back when the shock had passed); and
- the 'return on' and 'return of' being earned in respect of past investments was consistent with that earned under the price control regime.

Conversely, if revenue was systematically higher than long run cost as calculated, then it could be concluded that the growth in revenue was higher than required to meet new expenditure needs and/or prices had changed by more than needed to meet external shocks. As we noted in our previous report, comparing the long run cost so determined with the airports' actual revenues since the removal of price controls provides the most relevant test of whether the airports have complied with Review Principles 1 and 3.

The results of the comparison of the airports' actual revenues with the calculated 'long run cost' that we presented in our previous report are set out again in Figure 2.1 to Figure 2.7 below.

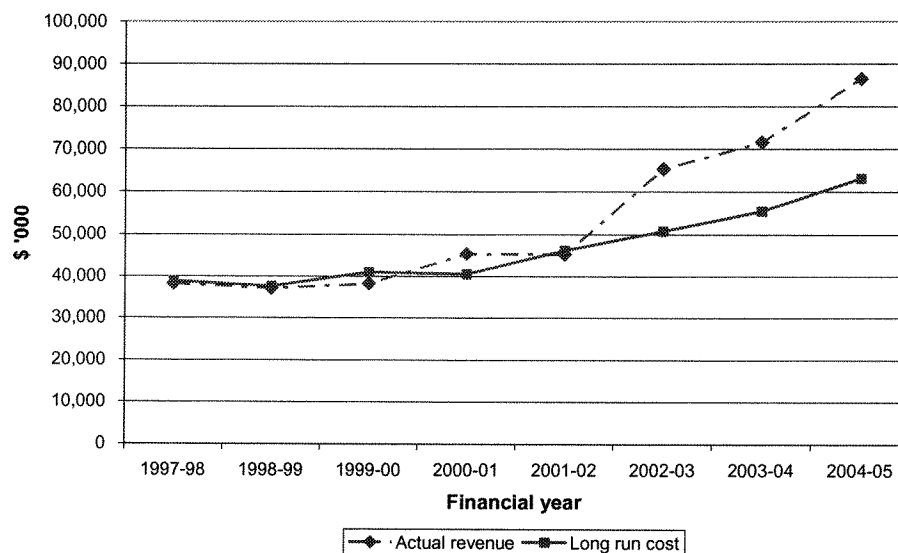
Figure 2.1

ADELAIDE AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST



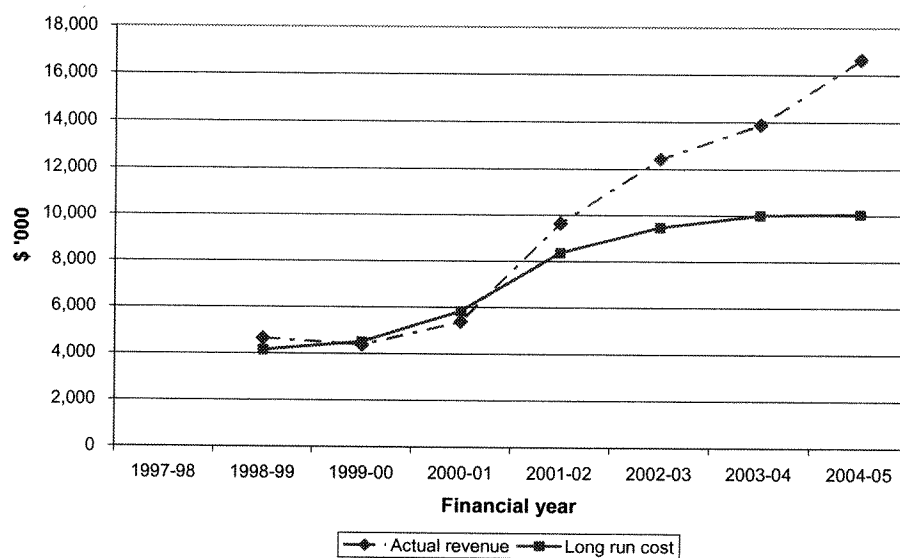
Source: ACCC Airport Regulatory Reports, 1997-98 to 2004-05

Figure 2.2

BRISBANE AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST


Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05

Figure 2.3

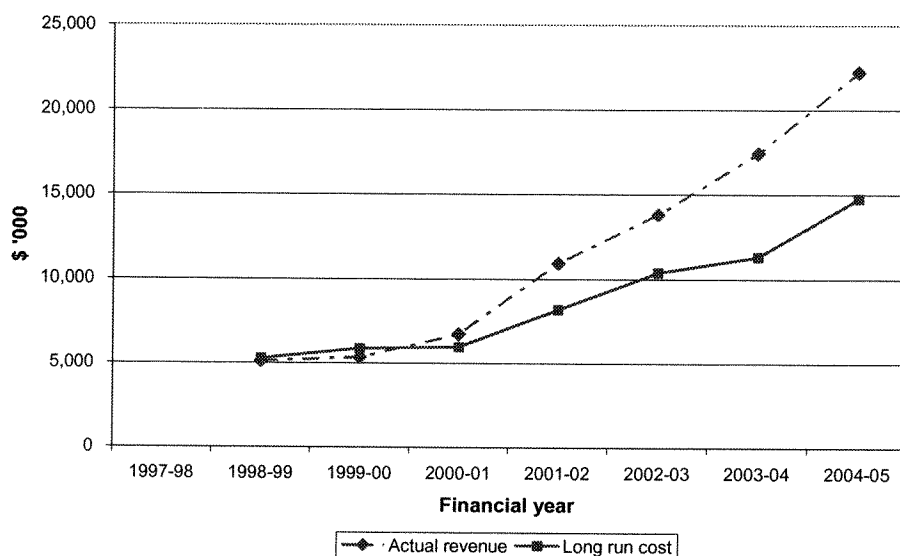
CANBERRA AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST


Note: Excludes \$67 million disposal of aeronautical assets reported in 2003-03.

Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05

Figure 2.4

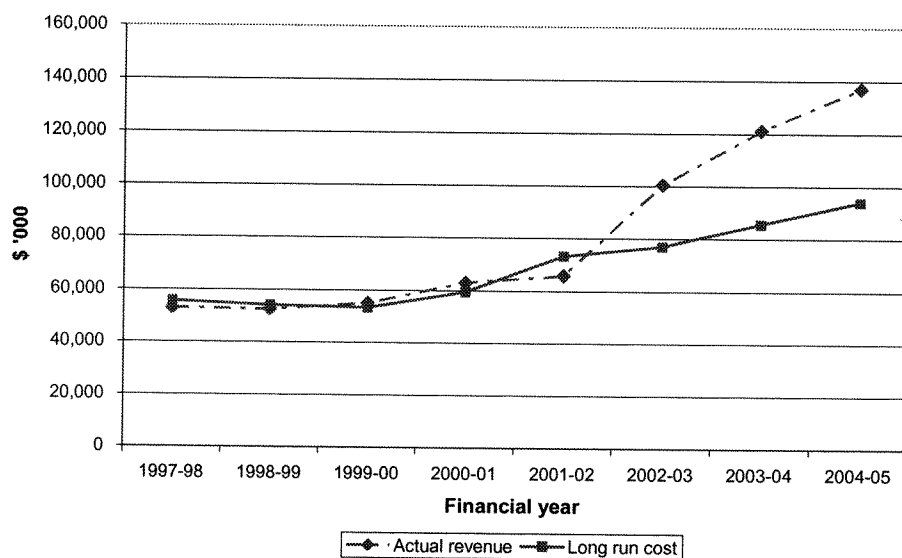
DARWIN AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST



Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05

Figure 2.5

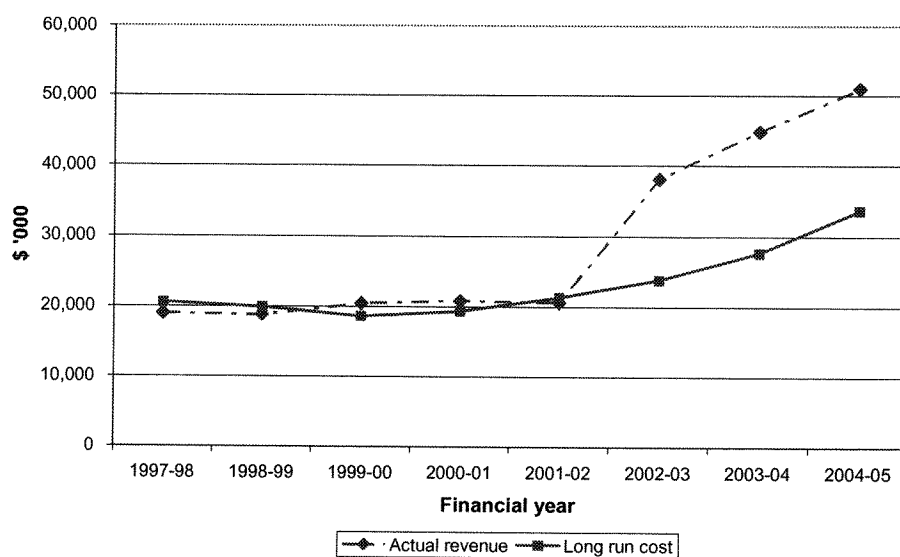
MELBOURNE AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST



Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05

Figure 2.6

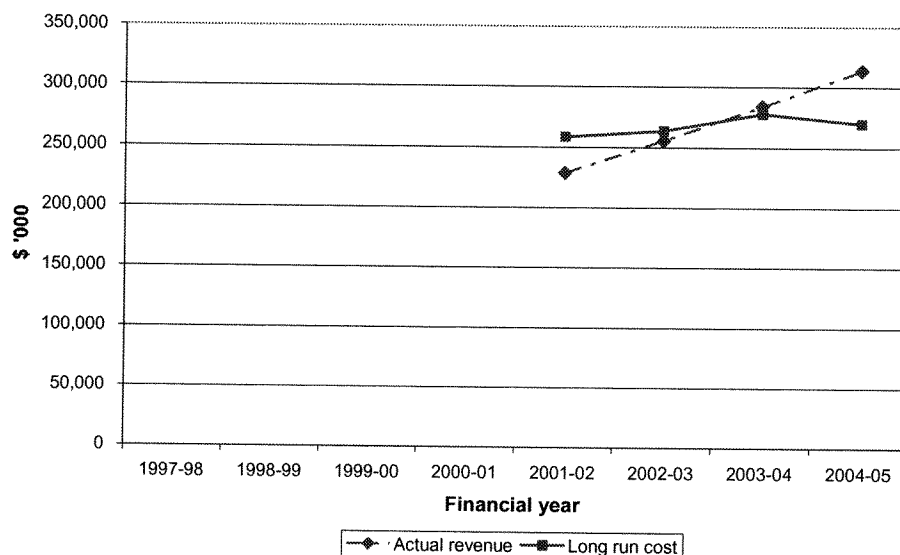
PERTH AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST



Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05

Figure 2.7

SYDNEY AIRPORT: AERONAUTICAL REVENUE VS LONG RUN COST



Source: ACCC Airport Regulatory Reports 1997-98 to 2004-05; ACCC 2001, *Sydney Airports Corporation Ltd.: Aeronautical Pricing Proposal: Decision*, May.

Over the period since the removal of the price controls, the growth in the airports' actual revenue has been substantially higher than the growth in 'total cost' and, if aeronautical prices remain as they are, this gap would be expected to continue to grow. It is important to note that the concrete reasons advanced by the Commission for price increases, including security costs and new investments, are accounted for in the long run cost figures presented. The only possible justification for the revenue increases that have been observed is that it is needed to recover a return on re-valued sunk assets, which the Commission has acknowledged does not have any merits on efficiency grounds,¹⁵ and with which we agree. This matter is discussed further in the next chapter.

¹⁵ Productivity Commission, *op. cit.*, pp. 90–91.

Chapter 3

Valuation of Airport Assets

3.1 The Productivity Commission's conclusions

The Productivity Commission has supported the general principle that 'assets should not be re-valued during an operating lease'¹⁶ and that 'asset revaluations should not provide a basis for higher charges for monitored aeronautical services'.¹⁷ It also acknowledges that there is a need to establish 'acceptable' starting values for monitoring purposes; however, it proposes to adopt the 'booked' regulatory values as at 30 June 2005 – including any revaluations that have been included therein – for this purpose.¹⁸

While we support the Commission's conclusions on the undesirability of allowing future revaluations to affect prices, as well as its conclusion that there is little economic merit to the argument that land assets need to be valued at 'opportunity cost', the choice of 30 June 2005 asset values is not appropriate for monitoring purposes, and not consistent with the Government Review Principles.

A principal reason of the Commission for deciding that the 30 June 2005 book values are a reasonable 'line in the sand' was a concern that:

'it would be unreasonable to penalise airport operators by changing the 'rules of the game' subsequent to the sale process'.¹⁹

It is difficult to sustain that the 'rules of the game' at the time the airports were sold included the expectation that airport operators would be able to revalue assets — to some undetermined extent and at some unknown but fixed date in the future — and claim the benefits of these revaluations through higher prices. We consider that a more realistic view is that any reasonable purchaser should have expected to be permitted to raise prices to recover an increase in expenditure requirements, or to recover from a 'demand shock', but not merely as a result of an arbitrary revaluation of sunk assets. The starting regulatory value that is consistent with this expectation is the value that was implied (or, for Sydney Airport, specified) by the previous price control regime.

Further the Commission argues that 'strict application of a no-revaluation policy would also require considerable unravelling of the asset values currently submitted for price monitoring purposes'.²⁰ This argument is without any basis. The 'unravelling' to which the Commission refers merely means replacing one set of book values with another set, all of which can be done in a simple spreadsheet.

¹⁶ Ibid., p. 98, Draft Recommendation 6.2.

¹⁷ Ibid., p. 95.

¹⁸ Ibid., p. 95.

¹⁹ Ibid., p. 93.

²⁰ Ibid., p. 94.

3.2 The appropriate approach for setting the initial asset value and the reasonable expectations of airport bidders

Given that opportunity cost does not provide useful guidance, other principles must be adopted to guide the choice of starting asset values. Two considerations are relevant:

- In the absence of congestion, the marginal cost of serving one further passenger is close to zero. To maximise allocative efficiency, prices should be as close to this marginal cost as possible — implying a low or even zero asset value.
- However, it is in the interests of dynamic efficiency that investors are treated reasonably and fairly, and receive a return on their investment, to create appropriate incentives for future investment.

There is a tension between these two principles. Allocative efficiency argues for a unit price of close to zero, while dynamic efficiency requires a higher price: how high, exactly, will depend on what a reasonable bidder would have expected, given the circumstances. The Productivity Commission resolves this tension by allowing partial revaluation, rather arbitrarily locking in book asset values at 30 June 2005. The implication of this decision must be that a reasonable investor, considering a bid, would have expected to be allowed to make such a revaluation, and have it reflected in prices.

However, this implication is equivalent to assuming that the purchasers of the airports expected to be permitted to raise prices in circumstances where such an increase could not be justified by an increase in cost or a change to demand, but merely as the result of an adjustment to a book entry. For an industry that was regulated when the assets were bought, and likely always to be subject to some form of regulatory oversight, this would be an extraordinary assumption.

The Productivity Commission concludes that ‘there was some ambiguity in the signals given to bidders about both appropriate “starting” asset values, and the scope to raise charges based on periodic asset revaluations without triggering a regulatory responses.’²¹ This ambiguity appears to relate primarily to the indication, by the Government, that the price cap regime was a transitional arrangement. The Commission notes that ‘there may well have been a reasonable expectation that the result [of the end of the price cap] would be more latitude on pricing outcomes’.

There does not, however, appear to be any ambiguity in the signals that were provided to bidders. The Government’s intention to constrain misuse of market power by the airports – even after the price cap – was clear. Greater latitude on pricing outcomes is relevant and beneficial in relation to negotiations for *new investment* and related matters – like the choice of the quality of airport services. There is no reason to consider that an expectation of ‘greater pricing latitude’ means that firms would have expected to be permitted to unilaterally raise prices in order to receive a windfall. Had this been the Government’s intention, then it could have made this expectation explicit and thus ensured that it captured the value associated with the growth in revenue through the sale price.

²¹ Ibid., p. 94.

Instead, reasonable belief would have been that price increases would have to be justified on the basis of new investment or actual increases in efficient costs or shocks to demand. This in turn implies that the asset valuations used in regulatory calculations are those that were consistent with the prices prevailing at the time of sale under the previous price control regime, as discussed further below.

3.3 The appropriate asset valuation method

The alternative approach – and, we consider, the most appropriate approach when evaluated against the Government’s Review Principles – to determining a starting asset value for each of the airports’ aeronautical assets is to rely on the fact that prices allowed under the price cap regime already *implied* an asset value for each of the airports (with Sydney Airport’s asset value being explicit rather than implicit). This approach is straightforward to apply and has been used extensively in economic regulation to ensure that there is a direct link between changes in revenue and changes in cost (and hence, provides incentives for new investment, incentives for users to choose the optimal level of service, etc) while also recognising that the starting prices reflect the fact that governments have contributed to the initial (sunk) infrastructure (as is the case with airports).²²

We have implemented this approach (reflected in the analysis presented in section 2.3 above) as follows:

- adopt a ‘seed’ value for the opening asset value for the aeronautical services;
- calculate the ‘long run cost’ that would be implied by such an opening asset value, that is, the sum of a return on assets, depreciation, operating expenses and a taxation allowance, with the asset value being updated over the period to reflect new capital expenditure, the depreciation amount that is included in ‘long run cost’ and disposals;
- compare the ‘long run cost’ calculated in step 2 above to actual revenue; and
- continue changing the opening asset value for aeronautical services until the value is found that equates with the ‘long run cost’ with actual revenue over the period that the price controls were in effect,²³ in present value terms.

For Sydney Airport, this process was more straightforward – as the formal price control that applied to it was calculated on the basis of an opening asset value for aeronautical assets, the ACCC asset value simply could be adopted.²⁴

As discussed above, this approach is consistent with the requirement that price increases be justifiable, where justifiable means that increases incorporate the cost of new investment or reflect shocks to demand, but are not simply a result of revaluation of existing assets.

²² See, for example, Essential Services Commission 2005, Advice to the Minister for Water: Regulatory Asset Values for the Victorian Water Businesses, Melbourne, available at <http://www.esc.vic.gov.au/public/Water/Consultations/Regulatory+Asset+Values/>.

²³ The period 1997-98 to 2000-01 has been used to determine the opening aeronautical asset value for Melbourne, Brisbane and Perth, and the 1998-99 to 2000-01 period has been used to determine the aeronautical asset value for Adelaide, Canberra and Darwin. While price controls remained in operation for part or all of 2001-02, this year has been excluded from the analysis given the unexpected effects of the collapse of Ansett and September 11.

²⁴ The ACCC determined an opening asset value for Sydney Airport of \$1404 million as at the commencement of the 2000-01 financial year.

Chapter 4

Cost of capital – Asset Beta

4.1 The Productivity Commission's conclusions

The Productivity Commission observes that:²⁵

[T]he risks associated with operation of major airports in Australia are now probably higher than in the past. In recent years, airports' operations and revenues have been significantly affected, at least temporarily, by a series of external shocks. In addition, the emergence of low cost carriers flying point to point and withdrawing services if they are not profitable has increased underlying traffic risk somewhat.

And that:

To the extent that short term variability in passenger numbers has increased, the pursuit by airports of rates of return somewhat above the benchmarks set by the ACCC five or more years ago would not necessarily be a cause for concern.

Although the Commission's opinion is imprecise, it appears to be endorsing a higher asset beta than used in previous regulatory decisions, in particular the ACCC's decision regarding Sydney Airport's 2001 price notification. That decision adopted an asset beta of 0.60, while SACL argues for a higher asset beta of 0.70 and other airports (e.g. Adelaide) appear to be arguing for an even higher value.

The Commission's reasoning appears to be that a higher asset beta is warranted than in the past, due to increased risk stemming from increased variability in passenger numbers, itself due to:

- a series of temporary external shocks (presumably the terrorist attacks on 11 September 2001 and the collapse of Ansett from mid-September 2001); and
- the emergence of low cost carriers flying point to point and withdrawing services if they are not profitable.

The Commission does not present any evidence to support its conclusions in this regard, relying only on intuitive arguments. These observations are not based on an analysis of a full range of the factors that may affect asset betas. Moreover, we note that intuition is of limited use when determining asset betas – even if the full range of matters that may affect asset betas can be identified (which can never, in practice, be known), the effect of each of those factors, and hence the net implications for the asset beta can only be guessed. Rather, the only robust means to derive an asset beta for any asset is to examine the available empirical evidence. Our preliminary analysis of this evidence does not provide any basis for assuming that the asset betas the ACCC previously applied to airports were understated (rather, the reverse is more likely).

The remainder of this section addresses first the Commission's intuitive reasoning about the likely changes in asset betas over recent years, and then presents some preliminary estimates of asset betas from empirical evidence.

²⁵ Productivity Commission, *op. cit.*, p. 99.

4.2 Reasons cited for a higher asset beta

As noted above, the Productivity Commission has argued that the perceived increase in the short term volatility of passenger numbers over recent years provides a basis for concluding the asset beta associated with the provision of aeronautical services has increased (and hence is now higher than the benchmarks adopted by the ACCC).

At first sight, however, it is not obvious that the increase in the variability in passenger numbers has any relevance for the cost of capital associated with the provision of aeronautical services. A cornerstone of modern financial economics is that much of the risk that is associated with the returns to a particular asset can be eliminated at no cost, merely by holding that asset together with a broad portfolio of other assets (diversification).²⁶ However, a portion of the risk associated with an asset cannot be eliminated through diversification, as no extent of diversification can shield investors from events that have an affect on all assets. It is this remaining risk – the non-diversifiable risk – that affects the returns that a (rational) investor would require to invest in a particular asset. The necessary implication is that the *variability* of returns is irrelevant; rather, what is important for asset betas is the *co-variability* of economic returns with the returns to the sharemarket as a whole.

Therefore, increased variability in passenger numbers (revenue) does not in itself entail a higher asset beta. The relevant consideration is whether there has been some structural change that now implies that the returns from the provision of aeronautical services are now more closely correlated with overall market returns.

We do not find it convincing that the two underlying reasons for passenger variability suggested by the Commission — external shocks and low cost carrier entry — to have caused such an increased correlation with the market, as discussed below.

The effect of external shocks – September 11

A recurring argument of airports, and one seemingly endorsed by the Commission, is that the events of 11 September 2001 are likely to have led to a step increase in the level of systematic risk associated with the delivery of aeronautical services.

It is clear that the September 11 events affected share prices of some of the listed airports. However, the relevant issue is whether the occurrence of the event has changed the sensitivity of the returns to any particular airport to the returns to the market as a whole. This could occur through one of two routes, namely:

- The fact that September 11 has occurred makes the demand for flights more sensitive to the economic cycles; or
- Events like September 11 are expected to recur at frequent intervals, and would be expected to have a substantial market-wide impact (i.e. cause both the returns of airport stocks and the market as a whole to fall).

²⁶ The benefits from diversification were first formalised by Markowitz in 1952, for which he later earned a Nobel prize, although the concept of diversification was earlier commented upon by Bernoulli and earlier still by Shakespeare: see Rubenstein, M., 2002, 'Markowitz's "Portfolio Selection": A Fifty-Year Retrospective', *The Journal of Finance*, Vol. LVII, No. 3, pp.1041-1045.

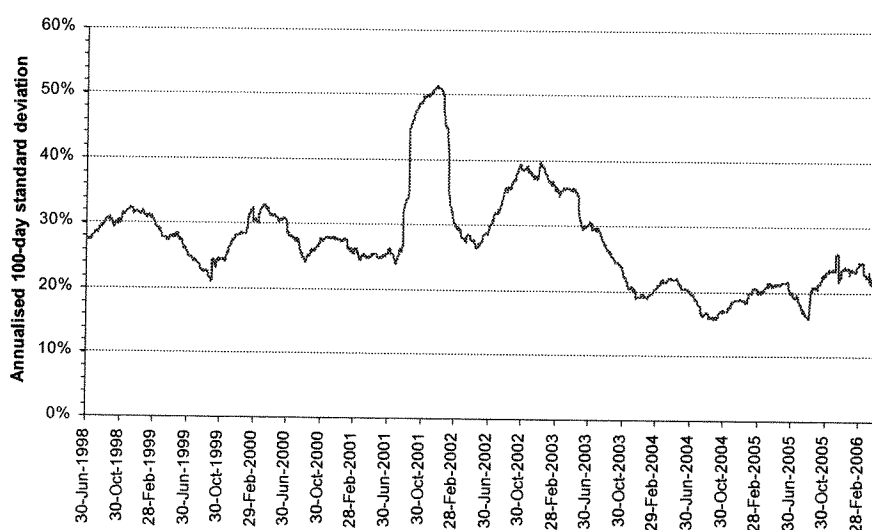
Considering first the intuitive (or *a priori*) merits of these propositions, we do not believe that either of these occurrences is likely. We are aware of no logical reason as to why the occurrence of the events of September 11 would have led to a rise in the sensitivity of air travel to macro-economic variables, and no qualitative argument to this effect has been advanced. We also find it implausible that investors would factor in an expectation that events like September 11 would recur frequently and have a substantial effect on the market as a whole. Indeed, we are unaware that it has been demonstrated that the events of September 11 had a substantial and enduring effect on share markets as a whole.

Empirical support for the proposition that September 11 would have led to a step increase in the beta of airports is limited. As noted, an increase in volatility of traffic of itself is insufficient for beta risk to have increased – as beta risk reflects the sensitivity of returns to economy-wide events rather than the total volatility of returns to the asset. Notwithstanding, where inferences are to be drawn about beta risk, airport usage is only a proxy for the variables of interest (and possibly a poor proxy) – rather the variables of interest are the *economic returns* to the asset in question and to the market.

Figure 4.8 shows the average volatility across a group of international comparison airports (see section 4.3 for a more detailed explanation of the choice of the airports). The specific measure of volatility is the observed volatility in daily returns over the previous 100 days, converted to an annualised figure.

Figure 4.8

100 DAY VOLATILITY IN DAILY RETURNS TO AIRPORTS – GROUP AVERAGE



Source: Daily share price data obtained from Bloomberg. Volatility recorded at a point in time reflects daily volatility over the previous 100 day period. Airport companies include in group: BAA, Auckland, Vienna, Zurich, Copenhagen.

The pattern in both of the figures above suggests that there was a step increase in the volatility in daily returns around the time of the September 11 event, which would have reflected the initial reductions in share prices at the time of the event and the subsequent recoveries. However, once the initial impact of September 11 has been dropped out of the data set (note that the use of 100 day volatility measure implies that one-off events last for 100 days), the figure then shows that the volatility in daily returns have returned to a level commensurate with that exhibited prior to September 11. Indeed, a simple eye-balling of the charts suggests that it is more likely that volatility has actually *fallen* since September 11, although we note that the variation in the daily volatility measure makes it difficult to draw such a conclusion.

Accordingly, our views are that:

- There are no sound qualitative reasons for the asset beta of airports to have risen as a consequence of September 11, noting that this requires an increase in the sensitivity between the economic returns to airport investments and the market as a whole to have increased.
- Even the proposition that the volatility of airport returns has increased (which is not sufficient for beta risk to have increased) is not supported by the evidence – our analysis of volatility in daily returns to airports before and after September 11 suggests that the volatility in returns to airport stocks has fallen back to levels commensurate with that exhibited prior to September 11.

Change in airline market structure and the emergence of low cost carriers

The second reason offered by the Productivity Commission for expecting greater systematic risk, and consequently a higher asset beta, is the emergence of low cost carriers. The Commission argues that these airlines (principally Virgin Blue and Jetstar) construct routes on a point to point basis and withdraw from unprofitable services, presumably in contrast to full service carriers.

Again, while the observations about the change to the market structure may be correct, we consider that it is difficult to justify the conclusions that are drawn. For the Commission's observations to have any basis, there would need to be reason to expect that the introduction and withdrawal of routes had increased the correlation between the returns from aeronautical services and the sharemarket as a whole. In turn, this would seem to require an assumption that routes could be introduced when in good economic times and the withdrawn when times are less affluent, only to be reintroduced again as the prospects for the economy improve.

However, there are significant coordination and transaction costs associated with modifying airline schedules. While low cost carriers may be more sensitive to the commercial prospects of individual routes and services, the (sunk) costs associated with opening new routes means that service decisions rationally would still be made on the basis of the long term prospects associated with a route, and not opened and closed depending on the state of the sharemarket. Indeed, the experience since 2001 does not reflect the kind of frequent route and schedule changes that the Commission's reasoning implies.

In contrast, however, one of the important implications of the entry of new carriers is that the degree of competition on many of the routes has increased. The increase in competition of users of a service (i.e. the airlines) is likely imply that the degree of countervailing power than any could exercise when dealing with the provider of the service (i.e. a airport) has fallen, and hence likely to increase the degree of market power of the airports. This increase in the airports' market power would be expected to reduce the systematic risk that is borne by the airport.

In summary, while the change in airline market structure since 2001 may have influenced the level of systematic risk faced by airports, it is not clear what the direction, much less the magnitude, of this influence has been.

4.3 Preliminary estimates of aeronautical asset betas

The estimation of the beta associated with a particular activity faces a number of well known challenges.

- First, estimating the equity beta for an entity requires continuous information on the economic returns for that entity, which restricts the estimation of betas only to stocks that are traded on a stock exchange.
- Secondly, the statistical precision of any individual equity beta estimate are generally very low, reflecting the fact that many of the events that affect an asset's returns are unique to that asset (i.e. not systematic). Accordingly, even where the relevant firm is listed, it is common practice to combine beta estimates for a number of 'comparable' entities in order to improve the precision of the estimated beta for a particular activity. A particular issue to consider is whether overseas entities should be considered.
 - It is generally accepted that caution needs to be exercised when using betas estimated in one market for firms in another; however, placing some weight on foreign comparators is inevitable where there are limited listed entities in the relevant domestic market – which is the case for airports in Australia. The potential error from using estimates of betas for foreign firms can be minimised by limiting the sample to entities from countries that are most like Australia, that is, have well-developed financial markets and legal and regulatory systems comparable to Australia.
- Thirdly, however, almost all firms undertake numerous activities as well as the one that is relevant in a particular case (in this case, providing aeronautical services), and the systematic risk associated with that common activity also can vary across entities. Accordingly, the selection of the set of comparable entities requires an exercise of judgement, trading-off, on the one hand, maximising the number of comparable entities (i.e. maximising the precision of the beta estimate) against minimising the potential for the unrelated activities to create a material bias in the beta estimate.
- Fourthly, as with all econometric exercises, the estimation of betas requires a number of methodological choices to be made, which may have a material effect on the results. Some of the choices include whether to use discreet or continuously compounded returns, raw or excess returns, nominal or real returns, whether dividends are included in returns, the definition of the market index the length and frequency of observations considered and whether techniques are used to avoid the impact of 'outlier' observations or events.

- Fifthly, once equity betas are estimated, adjustments need to be made for differences in the financial leverage, which requires a choice about the relationship between equity betas and leverage, and a choice as to how leverage is measured.

Deriving asset betas is a complex exercise, and one in which the exercise of judgement is required. In the time available, we have only been able undertake a preliminary analysis of the relevant data.

To obtain our set of 'comparable entities' for the purpose of estimating an asset beta for the provision of aeronautical services, we first looked widely at a large group of listed airports, and then examined their characteristics and omitted those airports that were not sufficiently comparable to the Australian airports. The characteristics most relevant to this selection include the regulatory regime in place, the degree of market power exercised by the relevant entity, the activities that each of the entities undertakes and any factors unique to an entity that affect the quality of the beta estimate obtained. As noted above, we have not had the opportunity to undertake a comprehensive analysis; however, our preliminary assessment is included in Table 4.1.

Table 4.1

INTERNATIONALLY LISTED AERONAUTICAL SERVICES PROVIDERS

Airport company	Aeronautical share (2001)	Comparable	Comment
AIA	37%	Yes	
Japan Airport Terminal	Na	No	JAT appears to be a specialist terminal operator, not an airport. Bloomberg reports that 75% of JAT's revenues come from souvenir shops.
BAA	30%	Yes	
TBI	Na	No	Grew very rapidly through acquisitions and then delisted in early 2005 following a takeover by Spanish construction company Abertis. Abnormal activity likely to have affected asset beta.
Vienna	77%	Yes	
Zurich	52%	Yes	
Beijing Capital Airport	61%	No	The Hang Seng Index reflects a much more volatile market than Australia's ASX, and a dissimilar legal/regulatory regime.
Malaysia Airport	58%	No	The Malaysian market is relatively immature compared with the ASX. In addition, Bloomberg reports that the airport has a significant and volatile events management business.
Copenhagen Airport	60%	Yes	

Source:

Turning to the time period over which we have sampled the beta estimates, given our views about the effect of September 11 on the asset beta, we do not consider there to be any justification for using only post-2001 data to estimate the asset beta for aeronautical services, but rather that a longer period of data should be used. The period of observations most commonly used by the generic beta estimation services use either 4 or 5 years of data. However, the use of only 4 or 5 years of data to estimate asset betas for utility-type services has been questioned, and recent analysis has demonstrated that better estimates of betas would be obtained from using a longer period of observations.²⁷ We consider that regard should also be had to betas estimated over such longer periods.²⁸

Table 4.2 shows the asset beta estimates for the firms that are derived in accordance with the method set out above. For consistency, we have calculated the asset betas from the estimated equity betas using the same debt beta and levering/de-levering method that the ACCC employed in the Sydney Airport decision.

Table 4.2

ASSET BETA ESTIMATES FOR AN EXTENDED PERIOD – ACG COMPARABLE ENTITIES

	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
AIA	0.92	0.80	0.82	0.74	0.76			
BAA	0.02	0.38	0.45	0.36	0.30	0.32	0.55	0.37
Vienna	0.75	0.72	0.89	0.85	0.74	0.66	0.69	0.69
Zurich	0.17	0.43	0.36	0.34	0.32	0.31	0.31	0.30
Copenhagen	0.21	0.41	0.56	0.49	0.66	0.42	0.41	0.42
Average	0.41	0.55	0.62	0.56	0.56	0.43	0.49	0.45

Source: Bloomberg raw equity betas against the Bloomberg-default home share market index over the period until 30 June 2006. Gearing is measured as the market value of equity divided by the sum of the market value of equity and book value of debt, averaged over the relevant period (with data obtained from Bloomberg).

Some of the observations that can be drawn made from these estimates.

- First, the average (mean) asset beta across the group of companies has varied from 0.45 for longest period of observations, to 0.62 for a comparatively short period (5 years), but was in fact lowest over the most recent period (3 years).
- Second, even in the longest available period following the events of September 2001 (4 years), the asset beta across the group averaged 0.55.

²⁷ A more comprehensive analysis of betas for airports would also involve an assessment of whether the boom and bust in technology stocks may have distorted measured airport betas, as appears to have been the case for energy utility stocks. Whether this is the case would depend upon whether investors interpreted airport assets as 'safe' or defensive assets. We are unaware of this issue arising in the context of airports.

²⁸ One of the effects of the events of 11 September 2001 is that there was some instability in the share prices of some of the airports. As equity betas are already estimated with substantial imprecision, including observations that include the effects of significant asset-specific events can lead to distortions to the beta estimates. One means of addressing this potential problem is to derive estimates of the asset beta that exclude data over the period of the instability – say, the year after the events of 11 September 2001. An alternative, simpler method would be to have regard to estimates of asset betas for only the period prior to the events of 11 September 2001 (that is, the period prior to the observed instability).

We also suggest that the estimates of asset betas for listed regulated infrastructure assets provide some information relevant to the derivation of an asset beta for the provision of airport aeronautical services, although we would expect the asset beta for airports to be somewhat higher than that of electricity and gas utilities. In the area of regulated energy infrastructure, the 'regulatory norm' has developed for an equity beta of 1 for an assumed gearing level of 60 per cent debt-to-assets. Using the same debt beta and levering/de-levering methodology, this implies an asset beta of 0.45.

As we explained above, obtaining robust estimates of asset betas for an activity requires a substantial degree of analysis, and in this vein, the results presented herein should be interpreted as preliminary estimates. That said, we consider that the results should be broadly indicative of the impact on the asset beta estimates of the conclusions reached above. In particular, we consider that the alternative empirical information presented above casts doubt on airport claims of the asset beta associated with the delivery of aeronautical services in Australia, and suggests that these claims overstate the systematic risk associated with these services. Indeed, on the basis of our analysis, it appears that the asset betas assumed by the ACCC in the pre-price monitoring period were themselves conservative overestimates, and lower values could be used.

We consider that a more thorough and systematic analysis of all of the evidence, adopting best practice techniques, is required.

Chapter 5

Efficiency Effects from Increases in Airport Charges

5.1 The Productivity Commission's Conclusions

In its discussion of the appropriate method to determine the starting regulatory asset value for the purposes of monitoring the airports' aeronautical charges, the Commission has observed that the initial value has little implication for economic efficiency, but rather is largely a 'distributional issue'.²⁹ The Commission's conclusion in this regard may stem in part from its belief set out elsewhere in the Draft Report that airlines (and low cost carriers in particular)³⁰ have the capacity to absorb increases in aeronautical charges, and presumably expected that this would occur.

As discussed in Chapter 3, it is apparent that the Commission's view of asset valuation being largely a distributional matter sits behind its draft recommendation to use the airports' June 2005 'book values' for aeronautical assets as the starting regulatory value for future price monitoring, even through this choice of starting regulatory value will sanction a large increase in revenue since the cessation of price control that cannot be explained by changes in cost.

However, there is no basis for the Commission to assume that an increase in airport charges would be absorbed by the airlines, irrespective of the extent of competition that the Commission considers to exist between the airlines. Airport charges are now predominantly charges on the basis of passenger numbers – and hence an increase in airport charges flows directly into the short run marginal cost to an airline of carrying an additional passenger. Even in a pure monopoly, theory predicts that much of the additional charge will be passed through to final customers. Moreover, even if charges were returned to a maximum take-off weight basis, higher airport charges would need to be reflected in higher charges to passengers over time in order for routes to remain profitable.³¹

If higher airport charges are passed through into final passenger prices it is inevitable that an efficiency loss will occur (at least in the absence of congestion) from an increase in airport charges.³² This reflects the fact that the short run marginal cost of landing a passenger is approximately zero, and so an increase in this charge will dissuade passengers from flying even though they place a greater value on the use of service than its social cost.

²⁹ Productivity Commission, op. cit., p. 91.

³⁰ Productivity Commission, op. cit., p. 9.

³¹ A 'maximum take-off weight' charge would provide the airlines with more scope to price discriminate between different classes of customers when recovering the charge, however.

³² We discussed at length how Government Review Principle 3 (which deals with congestion pricing) should be interpreted and applied, and note here that a central feature of that Principle is that the airports should not retain a windfall from setting congestion-based prices.

In the discussion below, the confidential results that were presented by Professor Tae Oum on the effects of a change in airport pricing on the number of passengers to the Australian Competition Tribunal during the Sydney Airport declaration matter are summarised. I understand that the full report has been provided to the Commission on a confidential basis. Professor Oum's most conservative set of assumptions about the extent of competition between the airlines suggest that a doubling of Sydney Airport's landing charge would lead to a reduction of approximately * passengers landing in Sydney per annum (excluding regional routes and Canberra), and that his more realistic assumptions about the extent of competition suggest that the passengers that are inefficiently dissuaded from flying to Sydney would exceed * per annum. These cannot be considered to be immaterial effects on welfare.

5.2 Effect of price of an increase in marginal cost

Where a firm's marginal cost increases, the extent to which it increases prices and hence passes on that increase to final customers depends upon the state of competition that is observed in the relevant market.

One polar case is perfect competition, which is characterised by every firm individually taking price as a given. In this situation, all firms set price equal to marginal cost, and hence an increase in the short run marginal cost that is borne by all firms will lead to that cost being passed on fully to final customers.

At the other extreme is the case of a pure monopoly (or a perfect cartel), where an individual firm has the ability to set the price for its product. If the simplifying assumption is made that the firm faces a (downward sloping) linear demand curve and constant marginal cost, then this model predicts that half of an increase in marginal cost will be passed through to final customers. This can be demonstrated as follows:

Assume an inverse demand curve given by: $P = a - bQ$, which implies a total profit for the firm of $\pi = (a - bQ)Q - cQ$, ignoring fixed costs. Profit is

maximised when output is selected such that: $Q = \frac{a - c}{2b}$, and when the

price is set at: $P = \frac{a + c}{2}$. Accordingly, when marginal cost (c) changes,

then the optimal price will change as follows: $\Delta P = \frac{1}{2} \Delta c$.

A case between these extremes is the case of a Cournot oligopoly, where it is assumed that each firm sets its price and output decision by observing the effect of its output decision on price on the assumption that its competitors will hold their outputs constant. For the case of a duopoly and again making the simplifying assumption is made that the industry faces a (downward sloping) linear demand curve and both firms have a common, constant marginal cost, then this model predicts that two thirds of an increase in marginal cost will be passed through to final customers. This can be demonstrated as follows:

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Assume an inverse demand curve given by: $P = a - b(q_1 + q_2)$, where $Q = q_1 + q_2$. The profit each firm is given by: $\pi_1 = (a + b(q_1 + q_2))q_1 - cq_1$ and $\pi_2 = (a + b(q_1 + q_2))q_2 - cq_2$, ignoring fixed costs. Noting that each of the firms selects its output on the assumption that the other firm keeps its output constant (i.e. $\frac{\partial q_1}{\partial q_2} = \frac{\partial q_2}{\partial q_1} = 0$), differentiating each profit function with respect to the firm's output and solving yields that each firm maximises its profit by selecting output given by: $q_1 = q_2 = \frac{a - c}{3b}$, which in turn implies that the price level would be given by: $P = \frac{a + 2c}{3}$. Accordingly, when marginal cost (c) changes, then the optimal price will change as follows:

$$\Delta P = \frac{2}{3} \Delta c.$$

The Cournot model as discussed is part of a class of economic models for predicting the outcomes of an oligopoly market known as 'conjectural variation' models. The 'conjectural variation' describes how one firm expects its rivals' output decisions to respond to its output decisions. As noted above, under Cournot equilibrium, a firm does not expect other firms to respond – and hence has a 'conjectural variation' parameter of 0. In contrast, under perfect competition, no single firm expects to be able to affect the market price, and so all must expect that any output increase of theirs will be matched by an output reduction of another firm, implying a conjectural variation parameter of -1. If an assumption about the intensity of response that is mid-way between Cournot oligopoly and perfect competition is assumed – i.e. -0.50 – it can be demonstrated that 80 per cent of an increase in marginal cost will be passed through to final customers.

Accordingly, the Commission has no basis for assuming that an increase in landing charges will not be reflected to some extent in final prices to passengers. An increase in such charges would raise the marginal cost to an airline of flying another passenger. While the extent to which the charge would be expected to be passed through to passenger charges depends, amongst other things, on the extent of competition that is considered to exist between the airlines, theory predicts that a substantial portion (half) would be passed through even if the industry was operated as a cartel, two-thirds under Cournot duopoly and more again if it is assumed that the relevant market is more competitive than a Cournot duopoly. About 85 per cent (on average, across the different fare classes) of any increase in marginal cost would be expected to be passed through under Professor Oum's preferred assumption about the state of competition in the market, which is discussed further below.

5.3 Case study: effects of raising airport charges on passengers flying to Sydney – Report by Professor Tae Oum

As discussed above, Professor Tae Oum from the University of British Columbia undertook an analysis of how an increase in landing charges at Sydney Airport would be expected to affect the number of passengers flying to Sydney Airport on Qantas and Virgin Blue for the purpose of the Australian Competition Tribunal's consideration of the Sydney Airport declaration matter.³³ The change in the landing fee that was tested was a doubling of the change, from about \$3 per passenger to \$6 per passenger.³⁴

The focus of Professor Oum's analysis for that matter was whether a uniform increase in pricing would have a differential effect on Qantas and Virgin Blue, and hence have an effect on the extent of competition between the airlines. His finding on this matter was that a uniform price rise would indeed be expected to more severe effect on the number of passengers that were carried by Virgin Blue than for Qantas (arising, for the most part, from Virgin Blue's greater reliance on fare sensitive passengers) and so dampen competition in the related market. However, the analysis undertaken also provides an indication of the welfare losses more generally from an increase in airport pricing.

Turning to the method employed, Professor Oum applied a 'conjectural variations' duopoly model to analyse how the outputs (passenger numbers) of the airlines would be expected to change as landing charges change. Being a 'conjectural variations' model, the assumption about the degree of competition between the airlines could be varied by changing the 'conjectural variations' parameter. This parameter is -1 for the most competitive markets (perfect competition and Bertrand oligopoly), 1 for the least competitive (pure monopoly or a cartel) and 0 for a Cournot oligopoly.

To apply the theoretical model, the market was broken down into three sub-markets – namely, business class travel, convenience sensitive travel and fare sensitive travel. A different assumption about the price sensitivity demand was used for the different market segments, with a price elasticity of demand of -0.70 and -1.6 used for the business class / convenience sensitive and fare sensitive segments respectively, based upon a review of the empirical evidence. Lastly, a combination of confidential information provided by Virgin Blue and publicly available information was obtained for the average fares and passenger numbers for each of the market segments on each of the seven routes that were modelled.³⁵

³³ We understand that the full statement has been provided to the Commission on a confidential basis.

³⁴ Professor Oum considered only the effects of an increase in landing charges, which account for approximately \$3 of the \$11 per passenger that Sydney Airport receives from all aeronautical services. Accordingly, a doubling of aeronautical charges is equivalent to an increase in aeronautical charges of approximately 27 per cent.

³⁵ The routes that were modelled (all one way to Sydney) were: Adelaide-Sydney; Brisbane-Sydney; Cairns-Sydney; Maroochydore-Sydney; Melbourne-Sydney; Gold Coast-Sydney; and Perth-Sydney.

As noted above, the model applied permitted a different assumption to be adopted for the state of competition in each of the market segments. In all of the analysis, the business class segment was assumed to be explained by the monopoly model, given that Qantas was the only provider in that market segment. The assumptions about the extent of competition (through the conjectural variation parameter) that were adopted in the three scenarios modelled are set out in Table 5.3 below.³⁶

Table 5.3

CONJECTURAL VARIATION PARAMETERS APPLIED FOR THE DIFFERENT MARKET SEGMENTS

	Fare sensitive		Convenience sensitive	
Cournot Duopoly	0	0	0	0
Bertrand Duopoly	-1	-1	-1	-1
Mixed case	-0.8	-0.9	-0.3	-0.5

The mixed case reflects Professor Oum's view that it is reasonable, amongst other things on the basis of the publicly available studies, to assume that:

- both airlines would compete heavily for the fare sensitive market and at intermediate levels in the convenience sensitive market; and
- Virgin Blue competes more heavily than Qantas in each of these markets.

The results for the overall reduction in passenger numbers flying into Sydney Airport across both airlines and across all routes that are implied by Professor Oum's results are set out in Table 5.4.³⁷

Table 5.4

REDUCTION IN PASSENGER NUMBERS ON FLIGHTS TO SYDNEY – LANDING CHARGE INCREASING FROM \$3 PER PASSENGER TO \$6 PER PASSENGER

	Cournot Duopoly	Bertrand Duopoly	Mixed Case
Reduction in passenger numbers	*	*	*

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³⁶ A conjectural variation parameter of 1 (monopoly) was applied to the business class segment in all cases.

³⁷ These numbers have been derived from Professor Oum's analysis. Oum's analysis sets out the percentage reduction in passengers that is forecast for each airline on each of the routes. These results are set out in the statement that has been provided to the Commission on a confidential basis.

Accordingly, under Professor Oum's most conservative set of assumptions about the extent of competition between the airlines suggest that a doubling of Sydney Airport's landing charge would lead to a reduction of approximately * passengers landing in Sydney per annum (excluding regional routes and Canberra), and that his more realistic assumptions about the extent of competition suggest that the passengers that are inefficiently dissuaded from flying to Sydney would exceed *, per annum. These cannot be considered to be immaterial effects on welfare.

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