Virgin Blue Application for Declaration of the Airside Service at Sydney Airport

Profit Maximising Monopoly Prices for the Airside Service

Report prepared for Gilbert + Tobin

June 2003
Frontier Economics Network

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1. Introduction

Gilbert + Tobin has asked Frontier Economics to provide advice on the extent to which SACL, acting as an unconstrained profit maximising monopolist, is expected to set prices for the airside service above the competitive level, taking into account the complementarities in demand between the airside service and non-aeronautical services.

Frontier has also been asked to advise on the expected size of any mark-up in the price of the airside service over competitive levels.

Frontier’s advice has been sought in the context of Virgin Blue’s application to the National Competition Council (“NCC”) for it to recommend that the airside service provided by Sydney Airport Corporation Limited (“SACL”) be declared under Part IIIA of the Trade Practices Act 1974.

This report responds to these requests. Specifically it outlines:

- A model for examining the size of the price mark-up over competitive levels that SACL could be expected to impose if it is not constrained in its pricing of the airside service;
- The extent to which SACL’s current prices for the airside service are likely to reflect competitive levels;
- Why complementarities in demand for non-aeronautical services would not constrain SACL from materially increasing prices for the airside service relative to competitive levels and considers the order of magnitude of the price increase that SACL could profitably impose;
- Why SACL would have incentives to continue to increase prices for the airside service until they reach a level that would be expected to have a significant effect on competition in the market for domestic air transport services to and from Sydney.

1.1. The airside service

The airside service has the same meaning in this report as in Virgin Blue’s Submission in Response to the National Competition Council’s Issues Paper (“the Submission”). That is, the airside service is defined as the use of those facilities necessary to allow aircraft carrying domestic passengers to:

- take-off and land using the runways at Sydney Airport; and
- move between the runways and the passenger terminals at Sydney Airport.
These facilities include at a minimum:

- the runways at Sydney Airport;
- the taxiways at Sydney Airport;
- the parking aprons at Sydney Airport;
- airfield lighting;
- airside roadways;
- airside lighting; and
- visual navigation aids.

Virgin Blue noted in the Submission that this is not an exhaustive list of the facilities required to provide the airside service and that the facilities required to provide the airside service may change over time. For the purpose of discussing possible price increases in this report, the airside service is taken to mean the use of the facilities listed above.

The term ‘aeronautical services’ is a commonly used term in economic literature. The term ‘airport charges’ is commonly used in recent Australian regulatory studies of the revenue and refers, in broad terms, to the charges associated with the provision of aeronautical services. The airside service is a subset of those services generally taken to comprise aeronautical services.
2. A model for considering the mark-up over competitive prices

Recent economic literature on airport regulation has highlighted the fact that complementarities in demand between aeronautical and non-aeronautical services will constrain the profit maximising level of monopoly prices for aeronautical services. This conclusion draws on a concept initially established by Cournot in 1838, and is a generally accepted conclusion.

However, the relevant question in considering the need for airport regulation generally, and the application for declaration of the airside service specifically, is the extent to which the unconstrained prices for the airside service will exceed the competitive level, taking the complementarities in demand into account.

A clear and robust algebraic model for considering:

a) an unconstrained profit maximising airport’s optimal prices for aeronautical services relative to the competitive level; and

b) the effects of complementarities in demand between aeronautical services and non-aeronautical services on the profit maximising monopolist’s optimal prices,

is detailed in Oum, Zhang and Zhang (2002). We outline the principal assumptions and relevant conclusions of this model here by way of background because it provides a realistic framework for the consideration of the price SA CL could be expected to charge for the airside service in the absence of regulatory constraints.

2.1. Main assumptions

The Oum, Zhang and Zhang (2002) model considers investment and pricing decisions for an airport under two different goals:

- In the first case, the airport has the goal of maximising social welfare (rather than profits). Under this scenario the optimum level of investment and the prices for aeronautical and non-aeronautical services are set at the competitive level.

- In the second case, the airport’s objective is to maximise profits.

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Important assumptions in the model that are relevant to our analysis include the following:

- Complementarities in demand operate such that an increase in the number of passengers results in an increase in revenues from non-aeronautical services\(^2\);

- Demand (defined as number of flights) for landing depends on the full price of air travel. The full price of air travel is the price perceived by passengers and includes the airport charges (which in turn include landing fees and passenger fees);

- Even when airport charges are set at competitive levels, the airport charges will be set to enable the airport to be financially viable. This means that if the airport is not congested, and the marginal cost to the airport of providing airport services for an additional flight are very low, the competitive level of prices will still allow the airport to cover operating and capital costs (taking into account revenue from non-aeronautical services); and

- Irrespective of whether the airport’s goal is welfare maximisation or profit maximisation, the airport will, over time, capture any monopoly profits associated with non-aeronautical services because the market in which competitors bid for the concessions (the right to supply non-aeronautical services) at the airport is competitive. Consequently, the airport should be able to extract the full amount of expected monopoly rents associated with non-aeronautical services through the lease arrangements.

### 2.2. Key conclusions of the model

Oum, Zhang and Zhang prove that an unregulated airport with a goal of maximising profits will set airport charges above the competitive level. This is one of the key conclusions of the model.

The extent to which airport charges are marked-up above the competitive level depends on a number of factors\(^3\) including:

\(^2\) Oum, Zhang and Zhang describe this as ‘uni-directional demand complementarities from passenger volumes (or aircraft movements) to concession sales’ (page 3). The term concession sales refers to the revenue the airport receives from non-aeronautical services.

\(^3\) Oum, Zhang and Zhang page 89. The full list of variables that affect the amount of the mark-up on airport charges imposed by the profit maximising airport relative to the competitive level includes the consumer surplus associated with sales of non-aeronautical services, the profits from sales of non-aeronautical services, the price elasticity of demand for air travel with respect to changes in the full price of air travel, the full price of air travel, and the change in social welfare that would result from small changes in the profit constraint under competition.
Profit maximising prices for the airside service

- the price elasticity of demand of air travel with respect to changes in the full price of a air travel as perceived by passengers;
- the full price of air travel; and
- the profits from non-aeronautical services that the airport receives.

In section 4 we consider the empirical evidence in the case of SACL using the basic framework adopted by Oum, Zhang and Zhang (2002) and the assumptions outlined in 2.1. This is sufficient to draw important conclusions about the magnitude of the mark-up on the price of the airside service SACL would be expected to impose when acting as an unconstrained profit maximising monopolist.
3. Assumed competitive level of prices for the airside service

Before considering the extent to which SACL may increase prices for the airside service relative to competitive levels it is useful to review how current prices compare to ‘competitive prices’ for the airside service.

The most substantive recent public assessment of SACL’s charges for aeronautical services (of which the airside service is a subset), is the Australian Competition & Consumer Commission (“ACCC”) review of SACL’s pricing proposals in 2000 – 2001. In its May 2001 decision regarding the pricing at Sydney Airport, the ACCC adopted the following approach:4

The commission considers that, as far as possible, the prices for aeronautical services at Sydney Airport should reflect the following principles:

- The cost base underlying the proposed charges is efficient;
- The airport operators faces appropriate signals for efficient new investment decisions;
- The airport users receive appropriate signals for the efficiency use of airport services; and
- The airport operator earns a reasonable rate of return which does not reflect monopoly rents.

That is, the ACCC adopted a competitive standard in determining the set of prices for aeronautical charges that it would regard as acceptable.

The competitive standard used by the ACCC is consistent with the approach adopted in Oum, Zhang and Zhang (2002) in explicitly recognising the aeronautical charges should enable an efficient airport to be financially viable (taking into account other sources of revenue), even if the marginal cost of providing aeronautical services is low. For the purpose of this analysis we assume that the prices outlined in the ACCC’s May 2001 decision regarding SACL’s aeronautical pricing proposal are a reasonable approximation to the competitive level.5

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5 Ibid. See, for example, the set prices which the Commission noted it would ‘not object to’ on page 23.
4. Expected price mark-up relative to competitive levels

The unconstrained profit maximising price for the airside service will be that which maximises the difference between revenue (from aeronautical and non-aeronautical services) and aggregate costs. We make the assumption that the marginal cost of handling extra passengers is zero. This means that maximising profits can be modelled as maximising revenue.

According to our model, an increase in the price of the airside service will increase passenger prices. This will reduce the number of passengers. Providing the percentage increase in the price of the airside service is less than the resulting percentage decrease in passenger numbers, revenue from the airside service will increase.

However, as all commentators acknowledge, the reduction in the number of passengers will also reduce non-aeronautical revenue. So SACL will increase the price of airside services if, and only if, the increase in revenue from the airside service is greater than the decrease in revenue from non-aeronautical services. The profit maximising airport will cease increasing prices when the rate of increase in the revenue from the airside service from an increase in the price of the airside service, is just equal to the rate of decrease in the revenue from non-aeronautical services.

A review of the data suggests that the prices for the airside service accepted by the ACCC in May 2001 as competitive prices are substantially below the profit maximising level. This can be determined by considering the extent to which profits would be expected to increase for a given increase in the price of the airside service taking into account the:

- price elasticity of demand for air travel as a function of the full price of air travel;
- proportion of the full price of air travel that reflects charges for the airside service; and
- the proportion of the SACL’s total revenue that is generated by the airside service.

The way in which we consider the impact of a change in the airside service is illustrated in Figure 1.
The extent to which the change in the price of a ticket affects the demand for air travel is referred to as the price elasticity of demand for air travel with respect to the price of tickets ($\varepsilon_{P(T)}$). That is:

$$
\varepsilon_{P(T)} = \frac{\% \text{ change in Quantity (No. Passengers)}}{\% \text{ change in Price (Tickets)}}
$$
The extent to which a change in the price of the airside service affects the demand for air travel is referred to as the price elasticity of demand for air travel with respect to the price of airside services ($\varepsilon_{P(AS)}$). That is:

$$\varepsilon_{P(AS)} = \frac{\% \text{ change in Demand}_{(\text{No. Passengers})}}{\% \text{ change in Price}_{AS}}$$

We would expect $\varepsilon_{P(AS)}$ to be very low, if the cost of the airside service is only a small proportion of the total price of an airfare.

The assumptions and data sources used in our analysis are listed in 4.1 and the estimated impact of a change in the price of air service on SACL’s total revenue under various scenarios is outlined in section 4.2.

**4.1. Assumptions and data sources**

**4.1.1. Price elasticity of demand**

It is difficult to obtain reliable estimates of the price elasticity of demand for air travel. It is widely acknowledged that the price elasticity of demand for air travel varies by fare class (e.g. business, economy, discount) and distance (since this affects the availability of alternative forms of travel). However, generally the price elasticity of demand is estimated at an aggregate level. Estimates vary widely and with most lying between -0.8 and -2.0.\(^6\)

A recent study of the demand for domestic air travel in Australia by Battersby and Oczkowski considers the price elasticity of demand for different classes of travel on four different routes between 1992-98\(^7\). Three of the four routes considered originate in Sydney.

The estimates of the price elasticity of demand ranged from -0.07 (discount airfare on the Sydney Melbourne route) to -1.68 (full economy airfares on the Sydney- Brisbane route). The estimates obtained in this study for the three routes originating from Sydney are outlined in Table 1.

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Table 1: Estimated price elasticity of demand for air travel in Australia
(Battersby and Oczkowski (2001))

<table>
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<th>Discount</th>
<th>Full Economy</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney-Melbourne</td>
<td>-0.07</td>
<td>-0.81</td>
<td>-0.10</td>
</tr>
<tr>
<td>Sydney Brisbane</td>
<td>-0.59</td>
<td>-1.68</td>
<td>-0.58</td>
</tr>
<tr>
<td>Sydney Coolangatta</td>
<td>-0.46</td>
<td>-1.63</td>
<td>-1.11</td>
</tr>
</tbody>
</table>

The estimates of the price elasticities of demand obtained by Battersby and Oczkowski (2001) are very imprecise (the standard deviation associated with the estimates is generally high). Further, they give somewhat counter-intuitive results about the price elasticity of demand for discount airfares. The results suggest that demand for discount fares is very price inelastic which is not consistent with experience in recent years. They note that this may be because the data used were for 1992-1998, which was prior to the entry of Impulse and Virgin Blue, and a period when discount tickets may have been more restricted.

Notwithstanding this they provide a useful guide. We propose to adopt a base case assumption of a price elasticity of demand of –1, and consider the impact on our conclusions of assuming a price elasticity of demands of –0.5 and –1.5.

4.1.2. Charges for the airside service as a proportion of the full price of air travel

The Productivity Commission report, *Price Regulation of Airport Services*, contains estimates of airport charges as a proportion of full economy airfares.\(^8\) We outline the estimates in the Productivity Commission’s report, and then comment on how these differ when only the airside service (which is a subset of the airport charges) is considered.

The Productivity Commission notes that:\(^9\):

> For domestic passengers, participants suggested that airport charges comprise 2 to 3 percent of the average airfare (MTAA Super Fund, sub. 22) while on particular routes this can be lower. For instance on the Sydney –Melbourne route (the busiest route in Australia), airport charges comprise less than 1 per cent of the total full economy airfare (Hastings Funds Management,

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\(^9\) Ibid page 128. The Report notes that these calculations were based on charges in place before the ACCC’s May 2001 Decision and SACL’s subsequent price rises, and before price increases at other airports following the change in the form of airport price regulation in October 2001. The Productivity Commission concluded that since airfares have also increased since September 2001, it is not clear how the proportions have changed.
sub 19), and are less than 0.8 per cent of a Canberra-Brisbane full fare (Capital Airport Group, sub. 32).

However, it is also acknowledged in the report that considering the airport charges as a proportion of 'total full economy airfares' may be misleading given that:

- airport charges include both terminal charges and landing charges, but incumbents that operate their own domestic terminals do not incur terminal charges. Airport charges (but not the price of the airside service) are therefore likely to be a greater proportion of an average airfare for a new entrant that does not operate a terminal; and

- the average airport charge will be a higher proportion of the total airfare for discount fares and for fares offered by low-fare carriers than for a 'total full economy airfare'.

On the basis of SACL’s stated intention to implement passenger based charges for domestic airlines using the runways at Sydney Airport of $2.86 per passenger (excluding security and GST) from 1 July 2003, we assume a price for the airside service of $2.86 per passenger. We also assume that this represents approximately 3% of an average airfare to and from Sydney. Virgin Blue would anticipate that average fare is likely to be higher than $100, but we adopt this as a conservative assumption.

4.1.3. Proportion of SACL’s total revenue generated by the aeronautical services and by the airside service

The ACCC’s Regulatory Report Sydney Airport 2001/02 provides information on the proportion of its total revenue generated by aeronautical and non-aeronautical services.

Aeronautical revenue is not disaggregated into international and domestic, nor does it isolate revenue from the airside service. In the notes to its accounts, SACL states that aeronautical revenue consists of aeronautical revenue from international flights, other flights, and recovery of costs of security procedures. SACL states that aeronautical revenue from domestic flights consists of:

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a) charges levied on aircraft runway movements (take off and landing) where the invoiced amount is based on the maximum take off weight of fixed wing aircraft and movements of rotary wing aircraft.

b) charges levied on arriving and departing passengers on airlines utilising the common user (Domestic Express) terminal.

c) time based aircraft parking charges.

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It is not possible to determine what proportion of SACL’s total aeronautical revenue is made up of revenue from the airside service based on publicly available information.

For the purpose of this analysis we have been instructed that a reasonable assumption is that the revenue from the airside service will comprise a proportion of total aeronautical revenue between 20 per cent and 30 per cent.

4.2. Estimated impact of a change in the price of the airside service

We consider the incentives for SACL to increase its price for airside services under three scenarios:

➢ Scenario 1 (Base case): In this case we assume:
  o a price elasticity of demand for air travel with respect to a change in the price of air travel of –1;
  o the price elasticity of demand for air travel with respect to a change in the price of the airside service is –0.03; and
  o revenue from the airside service accounts for approximately 25 percent of the SACL’s total aeronautical revenue.

➢ Scenario 2 (less conservative) We assume:
  o a price elasticity of demand for air travel with respect to a change in the price of air travel of –0.5;
  o the price elasticity of demand for air travel with respect to a change in the price of the airside service is –0.02; and
  o revenue from the airside service accounts for approximately 30 percent of the SACL’s total aeronautical revenue.

➢ Scenario 3 (extremely conservative): We assume:
  o a price elasticity of demand for air travel with respect to a change in the price of air travel of –1.5;
  o the price elasticity of demand for air travel with respect to a change in the price of the airside service is –0.05; and
  o revenue from the airside service accounts for approximately 20 percent of the SACL’s total aeronautical revenue.
Scenario 3 may be considered so conservative as to be scarcely realistic, but it is useful to demonstrate that even with these assumptions it is still profitable to increase the price of the airside service by up to 800%.

In each case:

- the starting point for the revenue comparison is SACL’s total revenue reported in the ACCC’s *Regulatory Report, Sydney Airport 2001/02*;
- the average fare (prior to any increase in the price of the airside service) is assumed to be $100. To the extent that this is less than the average fare on routes to and from Sydney, the estimates in Table 2 will understate the revenue gains to SACL from increasing the price of the airside service;
- in all cases we assume that the airside service comprises 3 per cent of an average airfare;
- we assume changes in revenue from non-aeronautical services are directly proportional to the change in the number passengers travelling. This is an extremely conservative assumption given that international passengers contribute far more to non-aeronautical revenue than domestic passengers, and a change in the price of the airside service will have little, if any, effect the number of international passengers; and
- we assume there is no change in revenue from other aeronautical services (i.e. other than the airside service) in response to the decrease in passengers. This is considered appropriate given that, we understand:
  - total payments required for usage of domestic terminals will not fall substantially if the number of passengers falls;
  - international passenger numbers are unlikely to be affected by a change in the price of the airside service; and
  - other significant components of aeronautical revenues are either cost pass through items or are charges to recover fixed costs which will be set to ensure full cost recovery.

Our estimates of the impact of a change in the price of air service on SACL’s total revenue under various scenarios is outlined in Table 2.
### Table 2: Estimated impact of a change in the price of the airside service

<table>
<thead>
<tr>
<th>Scenario 1</th>
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<tbody>
<tr>
<td>% Increase in the price of the airside service</td>
<td>100%</td>
<td>500%</td>
<td>1000%</td>
</tr>
<tr>
<td>Airfare</td>
<td>103</td>
<td>115</td>
<td>130</td>
</tr>
<tr>
<td>Change in the number of passengers</td>
<td>-3%</td>
<td>-15%</td>
<td>-30%</td>
</tr>
<tr>
<td>Revenue from the airside service ($m)</td>
<td>111</td>
<td>291</td>
<td>440</td>
</tr>
<tr>
<td>Revenue from other aeronautical services ($m)</td>
<td>171</td>
<td>171</td>
<td>171</td>
</tr>
<tr>
<td>Revenue from non-aeronautical services ($m)</td>
<td>217</td>
<td>190</td>
<td>156</td>
</tr>
<tr>
<td>Total revenue ($m)</td>
<td><strong>499</strong></td>
<td><strong>652</strong></td>
<td><strong>767</strong></td>
</tr>
<tr>
<td>% change in total revenue (relative to 2001/02)</td>
<td><strong>10%</strong></td>
<td><strong>44%</strong></td>
<td><strong>69%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% Increase in the price of the airside service</td>
<td>100%</td>
<td>500%</td>
<td>1000%</td>
</tr>
<tr>
<td>Airfare</td>
<td>103</td>
<td>115</td>
<td>130</td>
</tr>
<tr>
<td>Change in the number of passengers</td>
<td>-2%</td>
<td>-7%</td>
<td>-15%</td>
</tr>
<tr>
<td>Revenue from the airside service ($m)</td>
<td>135</td>
<td>380</td>
<td>641</td>
</tr>
<tr>
<td>Revenue from other aeronautical services ($m)</td>
<td>160</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>Revenue from non-aeronautical services ($m)</td>
<td>220</td>
<td>206</td>
<td>190</td>
</tr>
<tr>
<td>Total revenue ($m)</td>
<td><strong>515</strong></td>
<td><strong>747</strong></td>
<td><strong>990</strong></td>
</tr>
<tr>
<td>% change in total revenue (relative to 2001/02)</td>
<td><strong>13%</strong></td>
<td><strong>64%</strong></td>
<td><strong>118%</strong></td>
</tr>
</tbody>
</table>
In scenario 3 the maximum price increase for which we show results is an 800 per cent increase in the price of the airside service. This is because, under the assumptions used for scenario 3, we estimate that price increases beyond this point generate a smaller increase in SACL’s total revenue.
5. Profit maximising prices for the airside service

As demonstrated above, even under extremely conservative assumptions, we expect SACL could profitably increase the price of airside services by up to 800 – 1000 per cent.

It is not possible to estimate the maximum price that SACL could charge (i.e. the profit maximising price), because the price elasticity of demand for air travel with respect to airfares will change as SACL moves along its demand curve. There is no robust way for us to estimate the rate of change in the price elasticity of demand if SACL departs significantly from its current levels of prices. However, it is reasonable to assume that within the range of the change in airfares considered in section 4.2, the price elasticities of demand are stable.

As discussed in section 4, SACL, acting as an unconstrained profit maximising airport will only cease to increase its prices when the rate of increase in the revenue from the airside service from any additional rise in price, is just equal to the rate of decrease in the revenue from non-aeronautical services.

The relationship between the profit maximising price, total revenue from airside service and total revenue from non-aeronautical services is illustrated in Figure 2 below.
Figure 2: The profit maximising price for the airside service

[Diagram showing the relationship between price (P) and revenue (TR) for the airside service and non-aeronautical services.]
The graph at the top of Figure 2 shows the demand for the airside service as a function of the price of the airside service. \( P_1 \) could be regarded as the current price of the airside service.

In the absence of complementarities between the demand for the airside service and non-aeronautical services, a profit maximising monopolist could be expected to set the price of airside service at \( P^* \). As shown in the middle diagram in the figure, \( P^* \) is the price at which total revenue for the airside service is maximised. However, taking into account the complementarities in demand, the profit maximising monopolist will set prices at \( P_2 \), the point at which the sum of revenue from both the airside service and non-aeronautical services is maximised. In the diagram this is where the absolute values of the slopes of the total revenue lines in the second and third graphs are equal.

As noted in section 2, we have assumed that marginal costs are zero, to enable us to focus solely on revenue. In the more realistic case of positive marginal costs, profit maximising prices will be higher than those we have estimated, and the associated demand, or number of passengers, will therefore be lower.

The profit maximising level of prices for the airside service, taking into account the complementarities in demand, is expected to be associated with a substantial decrease in the number of passengers. Under the assumptions outlined in scenario 1, an increase in the price of the airside service of 1000 per cent would be consistent with moving towards profit maximising prices, and could be expected to result in a decrease in passenger number of around 30 per cent.

In summary, if SACL acts as an unconstrained profit maximising monopolist in setting the price for the airside service, it would have a significant effect on the market for air transport services to and from Sydney Airport.
6. Conclusion

Frontier Economics was asked to consider the extent to which an unconstrained profit maximising monopolist would be expected to charge above the competitive level, taking into account the complementarities between the airside service and non-aeronautical services. Frontier was also asked to advise on the expected magnitude of the mark-up over competitive levels.

Based on the ACCC’s May 2001 determination, we assume that the level of prices for the airside service accepted by the ACCC can be regarded as approximating the competitive level of prices for the airside service.

As outlined above, we conclude that:

- SACL, operating as an unconstrained monopolist, has a strong incentive to materially increase prices for airside services above competitive levels. The evidence indicates that complementarities in demand for non-aeronautical services would not constrain SACL from increasing prices for the airside service by at up to ten times the current level;

- SACL would have incentives to continue to increase prices for the airside service until the increase in revenue from a further price increase was exactly off-set by a decrease in revenue from non-aeronautical services.

At the profit maximising price for the airside service, SACL would be operating on a sufficiently elastic portion of the demand curve for airside services, that a further increase in the price of the airside service would result in such a substantial decrease in demand for air travel that the associated fall in revenue from the sale of non-aeronautical services is sufficient to offset the increase in revenue from the airside service.

If prices for the airside services are set at SACL’s unconstrained profit maximising level, it is likely to have a substantial effect on competition in the market for air transport services to and from Sydney.