APPENDIX A

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MARKET POWER AND THE PROFITABILITY OF AUSTRALIAN AIRPORTS - RESPONSE

PREPARED FOR A4ANZ

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CONTENTS

Tables

Figures

Boxes

1 MARKET POWER AND PROFITABILITY

A response to submissions to the Productivity Commission's Airports inquiry

The Australian Airports Association (AAA) has provided a number of submissions to the Productivity Commission in its inquiry into airport regulation. This has included engaging economic consultants HoustonKemp to examine the extent to which the pricing of aeronautical services by the four airports that are the subject of the airports price monitoring regime — administered by the Australian Competition and Consumer Commission (ACCC) — can be said to reflect the exercise of any market power.[1]

HoustonKemp argues that these airports may be assumed to have some market power but are constrained from exercising it. The empirical analysis supporting this finding is based on comparing a series of returns on aeronautical assets with an estimate of the cost of capital for the airports.

This short report responds to the analysis in that submission.

Analysis of airport profitability by the AAA and HoustonKemp

HoustonKemp takes the "structural likelihood" that the airports hold a degree of market power as a given.[2] HoustonKemp then suggests:

> *…the examination as to the exercise of that market power principally involves an assessment of whether prices or profits have been significantly above the workably competitive level over a sustained period. Our review of the literature shows that there are number of potential pitfalls to which careful attention needs to be given in any profitability analysis directed at the assessment of market power.*[3]

The most important of these pitfalls are said to be difficulties in estimating an airport's cost of capital (WACC), returns that vary with the capital life cycle, and the need for any finding of rates of profit above normal rates of return to be both significant and sustained for an inference as to the exercise of market power.

Houston Kemp's empirical assessment of airport market power relies primarily on an analysis of airport profitability for aeronautical services. This is derived as the annual rate of return on assets (EBIT as a percentage of the aeronautical asset base) for each of the four price monitored airports, using ACCC data. This is benchmarked against an estimated range for the pre-tax nominal WACC, based on

[1] HoustonKemp, *Assessing market power in aeronautical services: a report for the Australian Airports Association*, September 2018, (HoustonKemp report)

[2] HoustonKemp report, p. i.

[3] ibid.

HoustonKemp's view of the conventional regulatory approach to WACC determination over the monitoring period.

When measured returns are assessed on this basis, HoustonKemp concludes that:

> *Our analysis of reported rates of return in the provision of aeronautical services by the four airports show that average returns have in each case fallen within the average lower and upper bound estimates of the cost of capital for a benchmark Australian airport. Two airports – Perth and Melbourne – have reported rates of return below the mid-point of the 15-year average lower and upper bound WACC, while two others – Brisbane and Sydney – have reported rates of return above the fifteen year mid-point of those averages…*
>
> *…These results strongly support a conclusion that none of the four airports can be said to have set prices or achieved levels of profit that can be said to reflect the exercise of any market power.*[4]

Our analysis differs in important respects

We agree with HoustonKemp on certain aspects of the appropriate approach to assessing whether airports are exercising market power. We agree that a comparison of some measure of return against the opportunity costs of capital invested in the airport's operation is required, and that while there are dangers in drawing conclusion on profitability over short periods, a sufficient period has passed for the airports' rates of return to be usefully analysed. Unlike HoustonKemp, however, our analysis of market power and excess returns indicates that there is strong evidence that the major Australian airports have, in fact, exercised their market power.

Both of our analyses rely on the ACCC's monitoring data as a key input, and for the purposes of this analysis, we adopt HoustonKemp's WACC parameters to better isolate the differences in our approach.[5] For completeness, we note that HoustonKemp's WACC estimate is conservative – as airports would be expected to have an equity beta and overall cost of capital that is below that of the average listed firm.[6] This is because the airports considered have market power and control access to monopoly infrastructure, are subject only to price monitoring, and are generally considered safe investments akin to other utility infrastructure.

Two key points of difference in our approaches remain:

- First, we consider returns across the airport, rather than restricting analysis to aeronautical services. Our approach correctly accounts for market power that is held by airports in non-aeronautical services and avoids arbitrary cost allocations that reduce returns attributed to aeronautical services. See **appendix A** for further details.
- Secondly, we estimate excess returns using several methods, including the most theoretically appropriate measure of excess returns – the internal rate of return or (equivalently) the net present

[4] HoustonKemp report, p. 4.

[5] HoustonKemp's WACC estimates are reported in section 4 of its report. While we are able to replicate the lower bound WACC using the inputs supplied, our replication of the upper bound results in values that are around 1.5% less than those reported.

[6] With an equity beta of over one and using BBB-rated debt as benchmarks, the estimated WACC is above that of the average market listed firm. We estimate the cost of debt for a firm that has the average risk of listed entities would have gearing (debt / (debt + equity)) of 41 per cent, using data over the 2017 calendar year. Using May 2018 data, we estimate that the average firm credit rating (weighted by market capitalisation) is most likely between A- and BBB+.

value. This analysis uses cash flow data and opening and closing asset values. We cross-check these results against other measures including return on capital employed, assets and equity, and margins. Further details of this approach and other measures of profitability are described in **Appendices B and C**.

In all cases we find three of the four monitored airports have persistently earned returns above the cost of capital estimated by HoustonKemp, while Australian airport margins are the highest in a broad international sample which corroborates the main results.

Key findings – internal rates of return

We first estimate internal rates of return (IRR) for the monitored Australian airports using cash flow data derived from the ACCC's monitoring report, and opening and closing asset values (a "truncated" IRR – see **Appendix C**).

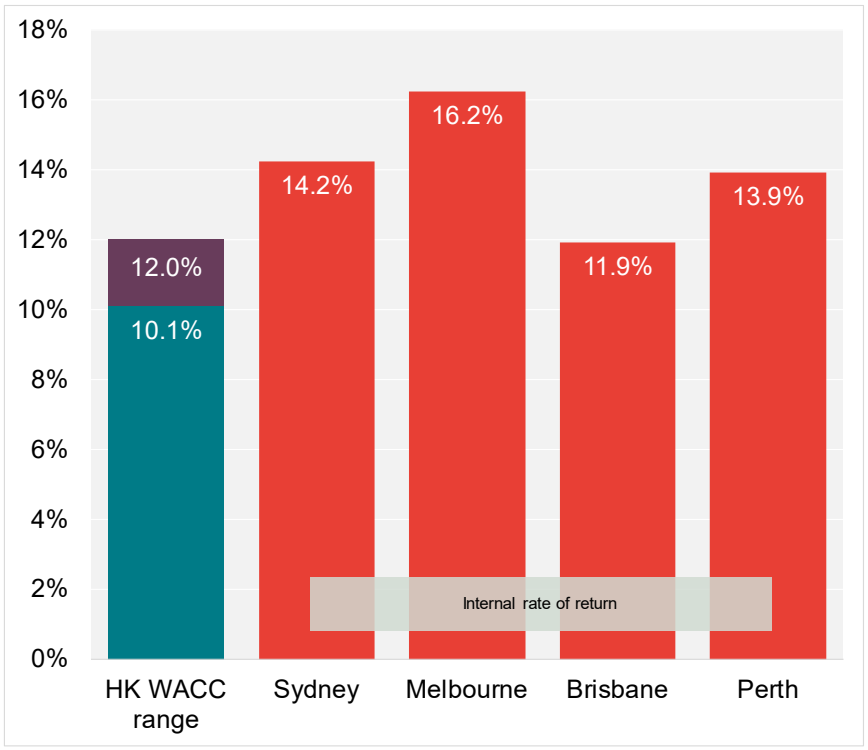
Our key findings from this analysis are as follows:

- Sydney, Melbourne and Perth airports have been exercising market power, reflected in economic returns to the owners that are well in excess of the cost of funds estimated by HoustonKemp.
- For Brisbane airport, economic returns to the owners are likely to be in excess of the cost of funds during the post-privatisation period, reflecting the exercise of market power. It is only at the top end of HoustonKemp's range that returns would not be considered excessive.
- The Government has likely captured benefits from the exercise of market power through the sale of the leases, reflected in sales prices well above the book value of assets. Returns are excessive across all airports if we include these returns in calculations.[7]

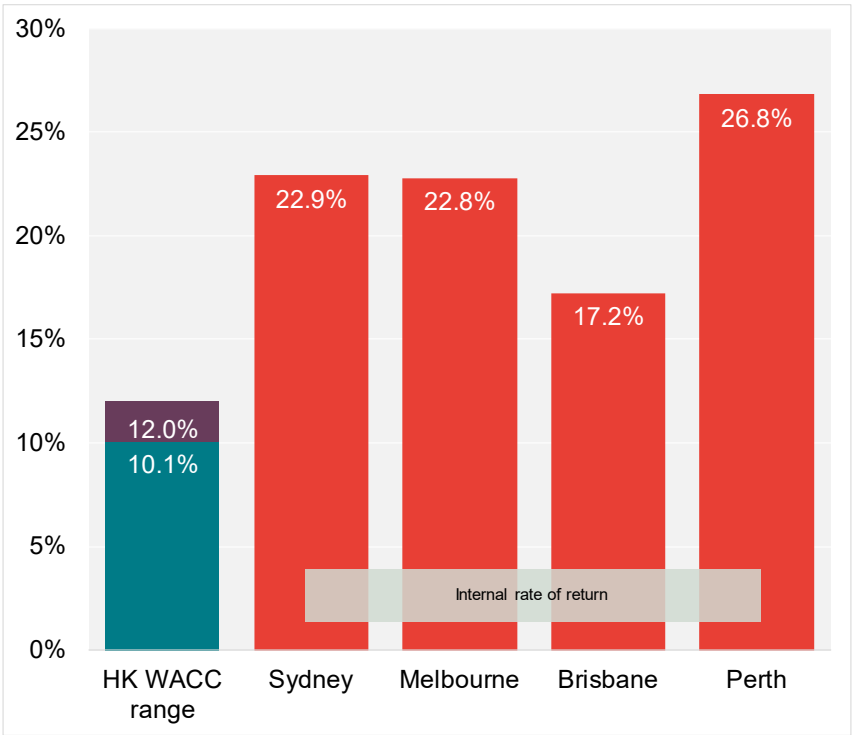
Figure 1 illustrates these results.

[7] Arguably, the later revaluations of assets undertaken by the airports were reflected of these sale prices. If the revaluations were netted off the revenue sought to be earned from those assets, it would have prevented the airports from windfall gains at the expense of its customers, but this did not occur.

Figure 1: Results of IRR analysis and comparison with cost of capital



Using sale prices as opening values, market value as closing values



Using book values as opening values, and market values as closing values

Source: Frontier Economics calculations based on HoustonKemp WACC parameters for all years

Notes: IRR uses nominal, pre-tax cashflows, over the period 1998-2017 for Melbourne, Brisbane and Perth, and 2002-2017 for Sydney. WACC estimated is nominal, pre-tax and averaged over the same periods. The upper bound of the WACC range corrects for an assumed error – see Appendix D for further details.

We further estimate the present dollar value of the excess returns accruing to the airports' owners. This suggests that the dollar value of the overcharging to airport users (including both airlines and other users) is large. In net present value (NPV) terms in years of the sales, the excess return is more than $3 billion, while taking into account the time value of money and bringing the value of excess returns to 2017 dollars shows the likely value of excess returns at around $7 billion.

Key findings – other profit measures

The results from the internal rates of return are corroborated by our other analyses of profit including returns on assets, capital employed, or equity, and comparative margins.

The other profit measures must be treated with more caution, because they are more reliant on accounting data relating to asset values. Airports were able to re-value assets to reflect higher earning potential, but with the effect of lowering measured accounting returns, as discussed by the Productivity Commission in 2006.[8]

To compare HoustonKemp's results with our own, we use results from the 2003 financial year onwards, even though revaluations of aeronautical assets only ceased in 2005 (as a result of the Productivity Commission's 2006 recommendations).

We first report return on assets[9], which is the sole measure identified by HoustonKemp. We compare returns compared to the upper and lower WACC bounds.

[8] The Commission noted that: "Since acquiring the leases, most of the price monitored airports have revalued their above ground assets, sometimes significantly… one important effect is to provide a possible justification for higher charges over time… From an efficiency perspective, the case for sanctioning higher charges based on changes in the 'optimised replacement value' of above ground assets, or the value of land in alternative uses, is weak. Productivity Commission 2006, *Review of Price Regulation of Airport Services*, Report no. 40, Canberra. See p. XXII.

[9] We follow the ACCC's monitoring reports in using tangible, non-current assets.

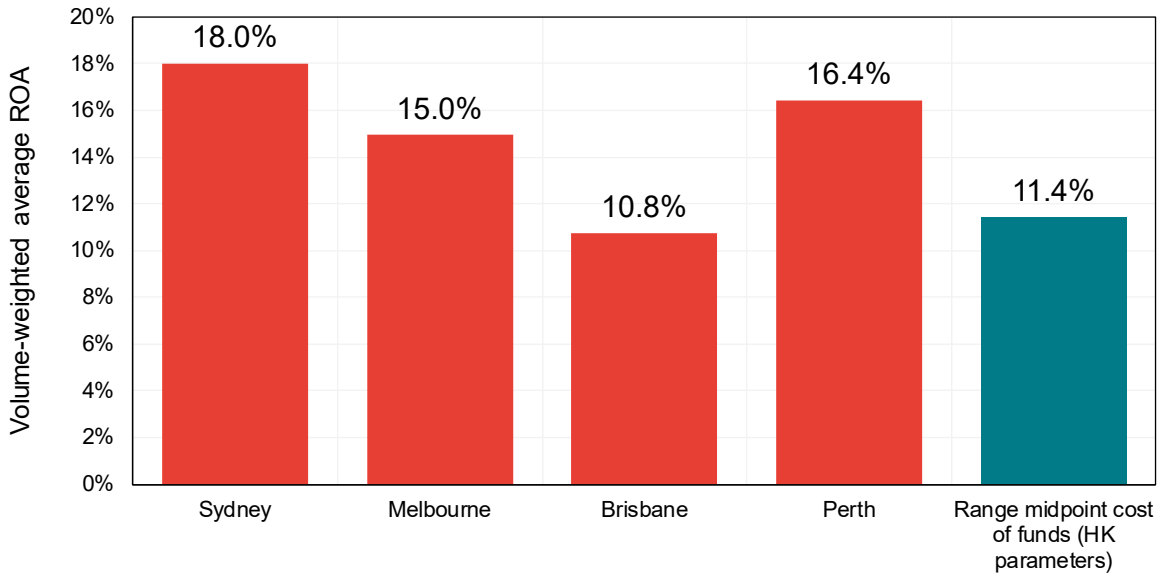
Figure 2: Return on assets and comparison with WACC range, 2003-17

Source: Frontier Economics calculations, using ACCC monitoring data and HoustonKemp WACC parameters (see Appendix D)

Sydney and Melbourne Airports are above the WACC range in each year. Only Brisbane is generally within the WACC range.[10]

Perth's average returns are also significantly higher than the WACC range, with more variability. Recent results are within or close to the WACC range as Perth has revalued non-aeronautical assets (which is not prohibited under the ACCC's monitoring). In particular, Perth increased the value of its non-aeronautical assets in 2012-13, which was accounted for as revenue in the accounts. This resulted in a large spike in returns in that year (as shown in the chart), while it also has the effect of reducing future returns because profits are divided by a larger number. Taking an average across the surrounding years indicates average returns are well in the excess of the WACC range. Averages across the period are further highlighted in **Figure 3**.

Figure 3: Return on assets, average 2003-17



Source: Frontier Economics calculations on ACCC monitoring data, HoustonKemp WACC parameters (see Appendix D)

We have also reviewed return on capital employed and return on equity, which are also common measures of economic profits. These figures corroborate the findings above, and in **Appendix D** we also highlight an independent Grattan Institute analysis which further supports the excessive return finding.[11]

High returns are persistent

In 2006, the Productivity Commission stated that one must be careful not to attribute excess returns to good fortune:

[10] It is also necessary to take into account that Brisbane increased the value of its aeronautical assets by $275 million between 1998-99 and 2003-04. This has the effect of depressing reported returns earned.

[11] Sydney Airports monitoring results have proven particularly problematic to analyse. We are unable to report a return on capital employed or a return on equity for Sydney Airport. This is because Sydney Airport reports after-tax losses and negative net assets in the ACCC's monitoring accounts in recent years.

A more rapid than expected growth in the market, as appears to have occurred at most of the monitored airports, will result in higher than expected revenues and returns because costs do not increase commensurately. Conversely, had the market grown less than anticipated, revenues and profitability would not have met expectations. It would thus be inappropriate to automatically infer misuse of market power from an outcome favourable to the airports that results from unforeseen circumstances.[12]

The key test of the good fortune argument is persistence: a tendency for returns to return to "normal". In our view, a period of more than 10 years since the Productivity Commission made its observation is sufficient time to draw conclusions on persistence. Our analysis has shown that while returns for Melbourne, Sydney and Perth Airports have clearly been above those required to service the cost of funds, there is no general tendency in the more recent data (return on assets) for such returns to become more normal.[13]

Key findings – comparative margins

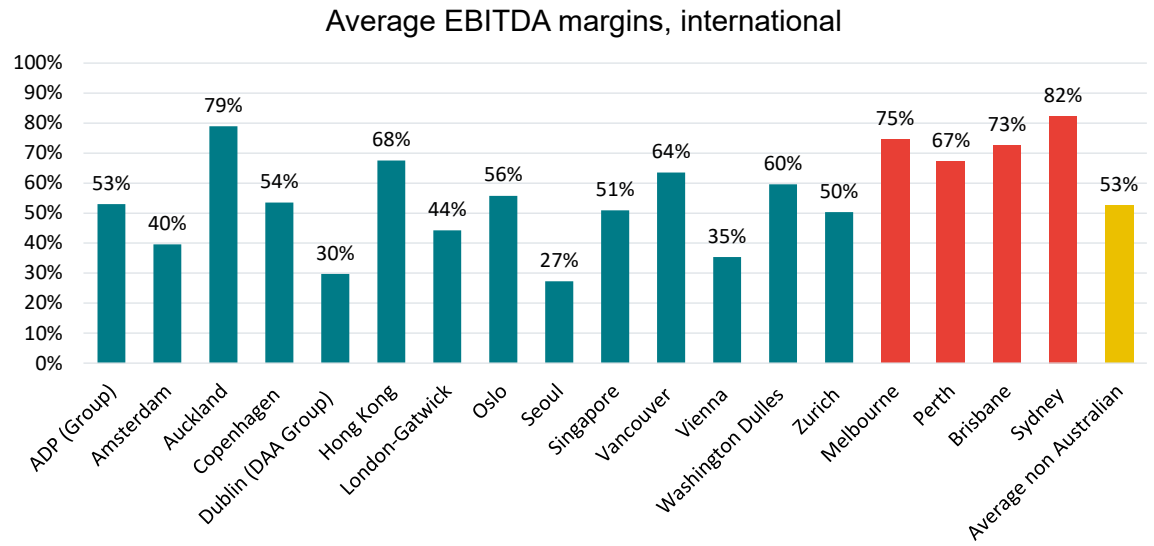
In the preceding analysis our benchmark was estimates of the airports' cost of funds. An alternate benchmark that can be used is the returns earned by airports that are subject to either competition, or effective regulation.

A comparison of margins has been undertaken as a cross-check on our main results. This comparison indicates that all of the monitored Australian airports have average EBITDA margins well above the average margin calculated across a sample of comparator airports (see **Figure 4**). Sydney earns the highest margin of any airport in our sample (more than 8 of every 10 dollars earned contributes to profits), and the other airports are all in the top 6.

12 Productivity Commission, *Review of Price Regulation of Airport Services*, December 2006, p.28.

13 Noting that Perth Airport's move into the WACC range is affected by its asset revaluation.

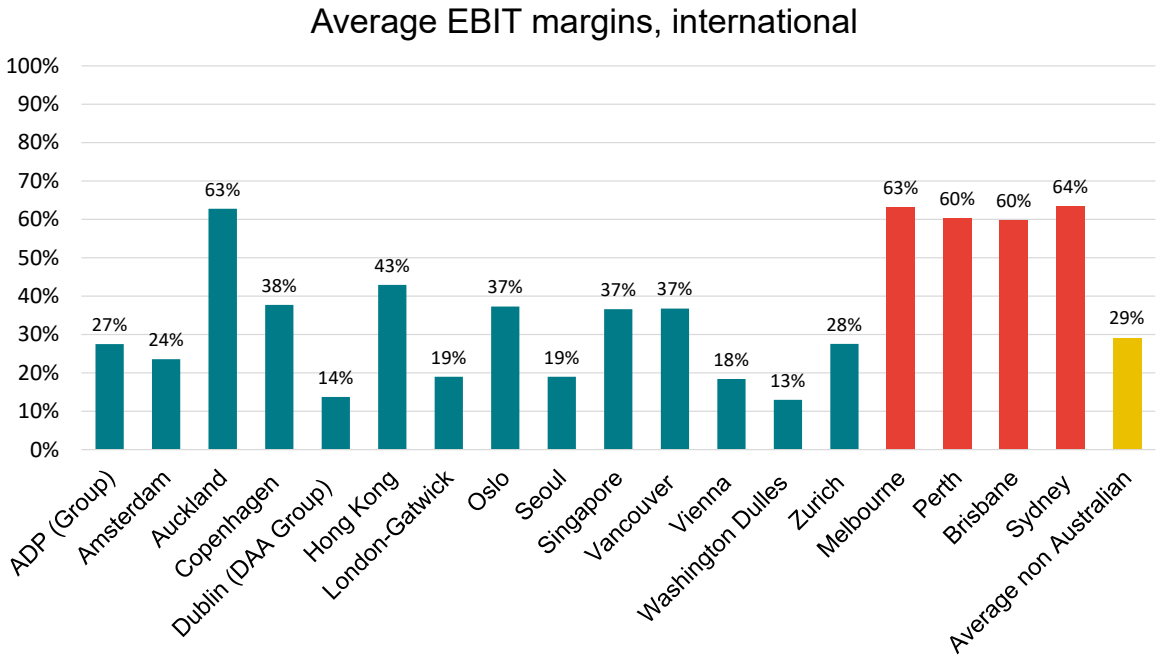
Figure 4: Comparison of EBITDA margins, 2008-2015



Source: Frontier Economics

To further assess whether differences in EBITDA margins could be due to different stages of the investment cycle (i.e. high investment leading to high capital charges), we also calculated EBIT margins for the same airports. This is reported in **Figure 5**.

Figure 5: Comparison of EBIT margins, 2008-2015



Source: Frontier Economics

It is apparent from these data that:

- average EBIT margins at all the Australian monitored airports – at between 60-64 per cent – are extraordinarily high by international standards where the average is 29 per cent). Only Auckland – another airport subject to price monitoring – has margins comparable to the Australian airports.
- the high EBITDA margins cannot obviously be justified by comparatively high capital investment, as EBIT margins are also relatively high. Sydney's higher relative depreciation charges narrow the gap with other Australian airports, but still leave its margins the highest in the comparator set.

We consider that these comparisons provide further support for the conclusion that the earnings of the Australian airports are consistent with the exercise of market power.

In the following appendices, we provide further detail about the derivation and utility of our results:

- **Appendix A** identifies why profits should be measured across aeronautical and non-aeronautical activities
- **Appendix B** discusses the methods of profit assessment used in this report
- **Appendix C** provides further details on the use of the truncated IRR method
- **Appendix D** identifies the data we use to derive our results, including the WACC
- **Appendix E** provides further detail on the use of comparative margins across airports
- **Appendix F** highlights the results of the Grattan Institute report on profitability across Australian industries, including airports.

A PROFITS ARE MEASURED ACROSS THE AIRPORTS ACTIVITIES

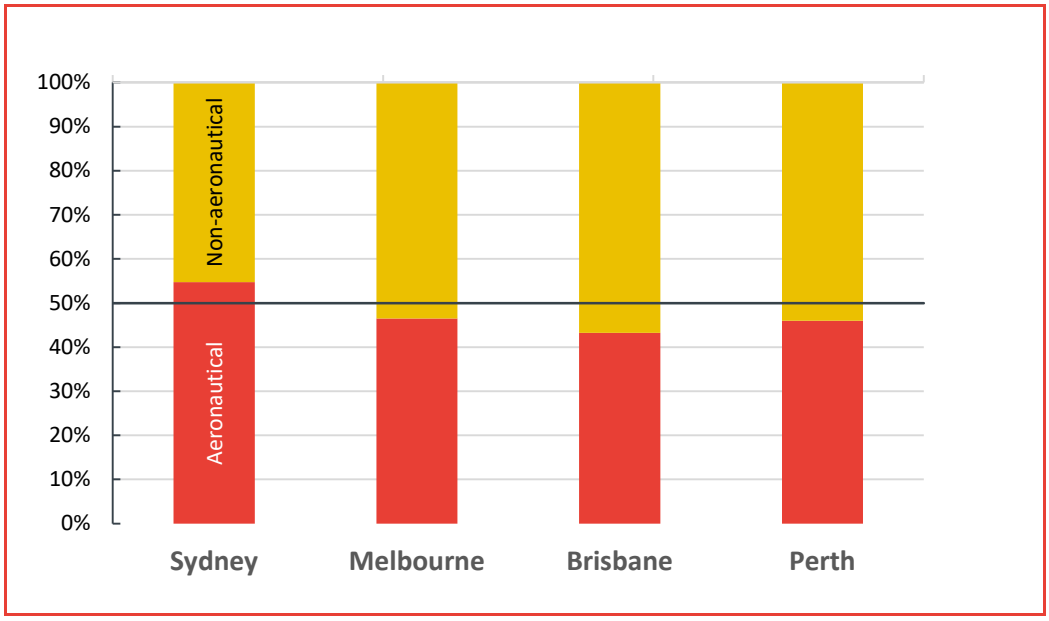
The balance of aeronautical and non-aeronautical revenues

Airports produce a number of different services that are supplied to different users. The key services they provide include:

- aeronautical services, such as access to runways, terminals and other airside infrastructure. These services are provided chiefly to airlines.
- landside access to the airport, via roads, parking and loading spaces. These services are provided to airport users, car hire companies, and transport providers (such as taxis)
- retail tenancies. These services are provided to retailers which provide services to airport users.
- property services. These services are provided to entities that use the airport for business operations, such as logistics companies.

An example of how the revenues of airports derive from different sources may be shown through an examination of ACCC monitoring reports. These indicate a similar pattern of non-aeronautical revenues being around 50% of total revenues.

Figure 6: Share of aeronautical and non-aeronautical revenues, FY2015-16



Source: ACCC monitoring reports

Airports as a platform

The demand for the airports' services is interdependent: the more flights to the airport, the more passengers; the more passengers, and the more retail services consumed. This interdependency indicates that the analysis of two-sided markets may be relevant to airports:

Two-sided markets involve two distinct types of uses, each of whom obtains value from interacting with users of the opposite type over a common platform. In these markets, platforms cater to both types of users in a way that allows them to influence the extent to which cross-user externalities are internalized. Rochet and Tirole (2004) offer a more precise characterization.

Examples include academic journals which cater to readers and authors; airports which cater to airlines and passengers; …[14]

Wright's characterisation of the functioning of airports is apt; but it is rather too simple. Airports also cater to car-hire companies, retailers and ground transport providers. That is, an airport might be better characterised as a multi-sided platform rather than a two-sided platform.

One characteristic of multi-sided markets is that the structure of the prices charged by the platform (in this case, the airport operator) takes account of the interdependencies among the demands of the various groups which are served by the platform.

Wright points out that, because of the interdependency of prices in a multi-sided market, one cannot draw any implications concerning market power from examining the relationship between a price and its marginal cost. He states:

To draw sensible inferences about (harmful) market power through price cost margins, loosely speaking one would need to demonstrate that the sum of fees to [both groups served by the platform] could be profitably raised above the costs of providing the service to [both groups served by the platform].[15]

Indeed, he states as one of the eight fallacies that arise from using one-sided logic in two-sided markets that "a high price-cost margin indicates market power'.[16]

All of the airports services should be considered in profitability analysis

The corollary of the above is that to draw sensible inferences about market power from profit margins, it is necessary to consider the revenues and costs from all services provided by the airport. In other words, the extent to which airports generate monopoly profits should be assessed with respect to the whole of their operations.

In a regulatory context, this is generally referred to as assessing a single till. As Malavolti explains, single-till regulation is preferred because the regulation of total profit of an airport is consistent with the

[14] Julian Wright, "One-sided Logic in Two-sided Markets", *Review of Network Economics*, Vol 3, issue 1, March 2004, p 44.l

[15] Julian Wright, "One-sided Logic in Two-sided Markets", *Review of Network Economics*, Vol 3, issue 1, March 2004, p 48.

[16] ibid., p 47.

airport taking into account the externalities that exist between retailing and aeronautical services – and, indeed, of services provided to other groups of customers.[17]

In the context of estimating service profitability, the same considerations apply. That is, if the airport takes into account the inter-dependencies between customer groups in its pricing, then it is effectively meaningless to consider the profits of "aeronautical" services charged to airlines, and "non-aeronautical" services charged to other airport users.

A better approach to recognise that competition in such markets will lead to normal profits being earned *across both sets of customers*, with the total marginal revenue from expanding passenger volumes equal to the total marginal cost. Put another way, there is simply no reason to believe that determining whether there are excessive returns from providing aeronautical activities should involve a comparison of the costs of aeronautical services with revenues from aeronautical services. Airports may quite rationally charge prices that result in the under- or over-recovery of the incremental costs of aeronautical services, as this can increase their profits overall. Ultimately, this is a decision made by an airport contingent on the relative service elasticities that it faces.[18]

In summary, the total profits of the airport should be considered as this is the only sensible comparison by which one can measure the exercise of market power

[17] Estelle Malavolti, "Single Till or Dual Till at Airports: A Two-Sided Market", Paper 14 (2014) Document de travail GREDEG at: http://gredeg.cnrs.fr/working-papers.html.

[18] A focus on the relationship between price and cost on an airport's aeronautical activities may be appropriate if (a) the extent of complementarity between an airport's services is weak and (b) returns on other activities are constrained by competition. In these circumstances, a finding that returns on aeronautical activities are moderate with respect to aeronautical costs would have some meaning. However, we have no evidence that this is true. Moreover, were it true that returns from other activities were constrained by competition, a comparison of total returns with total costs will also provide an accurate comparison (that is, adding services that recover a normal return to the profit calculation does not create a risk of error).

B METHODS OF PROFITABILITY MEASUREMENT

Profits as an indicator of the exercise of market power

Airports may exploit their market power in a range of ways:

- raising prices above their average costs of production, including the opportunity costs of the funds which they use in their operations
- under-investing in capacity (which helps raise prices)
- reducing service quality, if this results in a greater cost saving than the value of any output lost
- not being as cost efficient as they could be (the monopoly "quiet life")

While an airport's performance can be measured in a number of ways, as suggested by the list above, profitability the most direct single indicator of the exercise of market power.

The purpose of the empirical analysis is to provide an assessment of a factual case – "what has happened" – with a benchmark or counterfactual case – "what would have happened were the airports better regulated, or subject to the pressures of effective competition".

The most obvious benchmark is against the opportunity costs of funds employed. In the long run, a firm constrained by competition would earn no more than the opportunity cost of funds employed; firms that earned more would attract entry by competitors.

A further useful benchmark might be the performance of similarly-situated airports that are either regulated, or subject to effective competition. We will also analyse these benchmarks to corroborate our principal findings.

Methods of profit assessment — it is best to use more than one method

HoustonKemp summarises a range of economic and regulatory literature on the practical implementation and interpretation of profitability analysis for the purposes of assessing market power. Most of this is relatively uncontroversial. We agree with HoustonKemp that:

- Economics provides a relatively simple expression of monopoly profits; a return on funds in excess of the cost of those funds. While the expression is simple, measurement is complicated because the most appropriate timeframe to measure profit is over the activity's life, but it would only rarely be feasible to estimate this. As in the case with airports, we are usually more interested in profits during part of the life of an activity.
- The economic and accounting literature provides a number of methods by which the returns (and the cost of funds) may be estimated. Care must be exercised when attempting to measure market power by the rate of return on shareholders' funds. Financial accounting data has important limitations, and ideally data for many years should be available.

That being said, we do not agree with HoustonKemp that the use of return on assets is the best or only relevant measure of excess profits. In particular, we consider that it is feasible to use the most theoretically-appropriate measure of profits as the principal measure - net present value and internal rate of return. We cross-check this against other measures, including the principal measure identified by HoustonKemp (return on assets).

A significant benefit of this approach is that (for IRR estimates —our principal measure), we are able to use data for the entire period since privatisation, to avoid issues with taking 'snapshots' of data and inferring high profits from irregular or unusual events.[19]

The following table outlines the approaches that are commonly used to estimating economic profits.

Table 1: Estimating profits or financial performance proxies

APPROACH	DESCRIPTION	DATA REQUIREMENTS	ROLE OF THIS ESTIMATE IN OUR ANALYSIS
Internal rate of return (IRR) ~ net present value (NPV)	Most theoretically appropriate approach. Used to compare against (IRR) or computed with (NPV) a firm's cost of capital.	Relies on: - opening and closing asset values -all cash flows Estimate of airport's WACC over analysis period.	Principal measure
- Return on capital employed - Return on assets	Useful approximation to economic profit. Compared with a firm's WACC. Less reliable over short time periods.	Accounting data including asset values, opex and capex, revenues, plus estimate of airport's WACC. A reasonably long run of data is needed to make this reliable.	
Return on equity	Measures returns to shareholders. Compared with the cost of equity. Can be less reliable if tax / corporate structure issues.	Accounting data on profits, balance sheets, plus estimate of cost of equity	Used as cross-check
Other financial indicators - EBIT margin - EBITDA margin - EBITA margin	Limited economic meaning, but may be easier to compare across airports	Accounting data. Tends to be easier to measure that ROCE, ROA etc. because no measures of asset value required. Requires comparisons across airports.	

Source: Frontier Economics

[19] For example, a spike in demand might result in short run profits that would be expected to decline over time in the market was subject to competition.

C IRR AND NPV ANALYSIS

The most theoretically appropriate measure

The IRR/NPV analysis is the most theoretically appropriate measure of economic profit, and, correctly applied, has the greatest probative value.

Applying the IRR/NPV method is not straightforward in all cases. A key issue is that it requires a full set of cash flows for the relevant assets. However, the IRR can be calculated using periods less than the full life of an asset (a 'truncated IRR'). This takes the value of assets at the start and end of the analysis period into account and allows for the computation of returns earned during the period of cash flows.

Box 1: Truncated IRR

The truncated IRR is calculated using the following relationship:

$$NPV = 0 = A_0 + \sum_{t=1}^{t=N} \left(\frac{C_t}{(1+irr)^t} \right) + \frac{A_N}{(1+irr)^t}$$

Where

A_0 = opening asset value

N = time periods

C = (net) cash flows

A_N = closing asset value

irr is the discount rate that produces an NPV of 0.

Where a different WACC applies each year (for an NPV calculation, or to compare the irr to the average WACC over the period), then the cash flows may be discounted using these different rates.

An example of how we have applied this method is described in **Box 2**.

Box 2: Example of NPV/IRR with truncation

We further explain how the NPV / IRR is applied over a truncated period in the following example.

Assume an asset is acquired for $100, cash flows are expended and received for 6 years, and the asset is sold at the end of the sixth year for $50. With annual net cash flows of $20, the calculated ('truncated' IRR) is 13%. This is equivalent to an NPV of $0 at 13%. This figure can be compared with the entity's (or project) cost of capital to assess whether excess returns have been made.

	CASH FLOW PERIOD						
PERIOD	0	1	2	3	4	5	6
VALUE OF ASSETS	100						
CASH INFLOW		70	70	70	70	70	70
CASH OUTFLOW		50	50	50	50	50	50
NET CASH FLOW	-100	20	20	20	20	20	20 + 50
IRR	**14%**						
NPV AT 14% WACC	**$0.00**						

In this example, if the firm's WACC (for this project) was below 14%, then excess returns have been earned.

Source: Frontier Economics

To implement this approach for the Australian airports, we need cash flow data for the airports, and opening and closing asset values. We have cash flow data from the ACCC's airport monitoring accounts for the period 1997-98 to 2016-17.

Opening and closing asset values

The values for opening and closing assets in the truncated IRR/NPV analysis requires further consideration. The economic literature suggests a number of possible approaches. One approach says that valuation should be based on the notion of "value to the owner". This principle requires assets to be valued at the minimum loss that a firm would suffer were it deprived of the use of that asset.

For example, if a firm were operating in a competitive market, then it would be appropriate to value assets on a "modern equivalent asset" basis. This is akin to the replacement costs of the assets (where what is replaced is the service functionality).[20] This is because a firm operating in a competitive market could expect to earn no more than the (optimised) replacement cost of assets – earning more than this would attract entry.[21]

Where we are interested in assessing profits in situations of strong market power, there are some further considerations which influence our choice of valuation method:

[20] This also assumes that the firm would replace its assets if deprived of them. In some instances, firms may not replace their assets because the cost of them could not be recovered, and the assets should be valued at their recoverable value.

[21] This is indeed the basis for Tobin's q; a well known indicator of market power. This measures the relationship between the measured market value of assets and the MEA of assets used. A measure of >1 is indicative of market power.

- We want to avoid a situation where high returns are built in (capitalized) into the opening values for assets. While this would be an appropriate measure of the returns to the acquirers of the airport, it would understate returns earned during the period by the airport.[22]
- Historic cost or book values for assets as the opening values would be appropriate if this is the likely amount that would be recoverable from users (and so could form the basis for the value to the owner).[23] For example, firms regulated using building-block style regulation essentially recover the historic cost of investments (so long as these are considered efficient), with a suitable return on capital invested. Depreciated optimised replacement costs might also be suitable for this purpose.
- The primary purpose of this report is to assess the extent to which Australian airports have been able to exercise market power following the removal of formal economic regulation and price control. In order to estimate the effect of the removal of price control we have to make some assumptions of the period over which it will be removed. We assume that the current regulatory arrangements will continue indefinitely. For this reason, the closing value of the assets should be based on market values..

In the absence of a sale value, we can approximate market valuations by adopting methods commonly used in commercial settings. For example, businesses are generally valued using an earnings multiple, or a single stage or multi-stage dividend growth model. A generic form of these models might, for example, divide current earnings by a discount rate, or multiply a form of current earnings by an earnings multiple. These models could be applied to the earnings of the Australian airports and, in the case of Sydney Airport, be checked against sharemarket capitalisation.

Different values allow for different questions to be examined

We resolve the questions around appropriate asset values with reference to the questions that our analysis asks:

- The first question we seek to answer is: have the airports' owners been exploiting market power in earning excess returns?
- The second question is: have users been subject to additional costs resulting from monopoly premiums being built into the sale prices for assets?

In seeking to answer the first question, the most logical perspective is to adopt the market values of assets; that is, to use the lease prices paid at the time of sale, and to use the current market value of the airports.

In seeking to answer the second question, we should seek to use an opening asset value that reflects the costs that would have been recovered from users in the absence of the sale and the building in of the lease premiums. This can be estimated from the book values in the ACCC's monitoring of the airports. Closing asset values should again come from a market valuation; in a monopoly context with high barriers to entry and no expectation of future regulation, there is no reason to think that returns will be capped by the airport's own replacement value of its assets.

[22] Consider an example where the market value of assets was $100, but the replacement cost of assets to the airport was only $50 (and barriers to entry explain this divergence). In this case, the $50 excess return will be recovered part during the period of analysis and part reflected in the final asset value. Using a $100 start value will understate the returns earned – which will be more significant the longer is the series of cash flows.

[23] Under certain circumstances, the historical costs might not be too different from the concept of MEA value. In particular, historical costs would be close to the MEA value where: assets are not subject to significant technological change; assets have not seen significant price inflation or deflation; intangible assets are not significant. All of these factors suggest that historic costs would provide a reasonable indication of replacement costs; airport assets are not subject to technological change, Australia has had a stable macroeconomic environment for many years, and there are few intangible assets associated with airports. The kinds of intangible assets that would be reflected in goodwill relevant to a profit analysis is that acquisition of brand names or other assets. This is not relevant to an airport.

D DATA USED IN THE PROFITABILITY ANALYSIS

ACCC monitoring data

We compiled all of the ACCC's monitoring data, for the period 1997-98 to 2016-17. These data include, for each year and airport:

- an income statement,
- a cash flow statement, and
- a balance sheet.

These statements are split into aeronautical and non-aeronautical costs, revenues and assets.

"Line-in-the-sand" asset values are also reported for Sydney and Brisbane airports for aeronautical assets, following the Productivity Commission's 2006 recommendation that asset valuations be stopped to mask higher returns being offset against rising asset values. Melbourne and Perth do not report such values as they have not undertaken asset revaluations since the date of the "line in the sand" (30 June 2005).

The data that is available allows us to calculate:

- Returns on capital employed
- Returns on tangible non-current assets
- Return on equity
- Margins (such as EBITDA/Revenue)

For our main IRR/NPV analysis, opening and closing asset values need to be determined. We can determine book values for these assets from the regulatory accounts; however, to use market values for assets other sources of data are required.

Key inputs to NPV / IRR calculations

Cash flow data

The ACCC monitoring data provides information on cash inflows (receipts from customers) and cash outflows (payments to suppliers and acquisitions of property, plant and equipment).

The cash flow data are summarised in **Figure 7**. It shows a regular pattern of increases in receipts from customers, and outgoings that are generally steady but spike in periods of investment. This reflects that airports tend to have relatively lumpy investment cycles.

Figure 7: Cash flow data for monitored airports

Source: ACCC monitoring reports

Opening values for assets

Sale prices for the lease of the airports were obtained from the ANAO.[24] These are used as opening values when we compare market valuations.

[24] https://www.anao.gov.au/sites/g/files/net3721/f/ANAO_Report_1997-98_38.pdf for Brisbane, Perth and Melbourne, and https://www.anao.gov.au/sites/g/files/net616/f/anao_report_2002-2003_43.pdf for Sydney. Accessed February 2018.

Book values for assets were obtained from the ACCC's monitoring data. We did not, however, include goodwill, lease premiums or (in the case of Sydney) asset revaluations in the asset base. These premiums reflect an expectation of future profits, so that if we use these we could falsely conclude that no monopoly returns had been earned. We further considered the use of DORC valuations, but these are problematic because these were only calculated for aeronautical assets (not non-aeronautical assets). However, based on the experience of Sydney Airport, it is not obvious that these values would be materially higher.[25]

Table 2: Opening asset values

AIRPORT	SALE YEAR	SALE PRICE $M	OPENING BOOK VALUES[26] $M
MELBOURNE	1997	1 255	689
BRISBANE	1997	1 314	715
PERTH	1997	631	182
SYDNEY	2002	4 233	2 036

Source: ANAO, Audit Report No. 43 2002-03, Audit Report No. 38 1997-98

Final values for assets

Final values of assets are estimated market valuations. For Sydney Airport, we are able to rely on a market valuation directly. However, for Brisbane, Melbourne and Perth, which are unlisted, we need to use an approach based on multiples of current earnings, cross-checked against other available data.

A common valuation approach for infrastructure assets is to apply an "EV/EBITDA" multiple. EV or enterprise value is a measure of market capitalisation but also includes net debt so as to reflect that businesses which carry less debt are less risky (for the same market valuation).

The EV/EBITDA valuation approach is used widely to compare airport transactions. For example, information from PWC based on historic European sales between 2009-2014 suggested that airports traded at a value of around 14 times EV/EBITDA.[27] However, there in strong evidence which suggests a 14 times valuation is too low in current circumstances of the Australian airports:

- Information from Sydney Airport indicates that it has commonly traded at much higher multiples than 14 times EV/EBITDA. In fact, Sydney's EV/EDBITDA multiple has been just above 20 in recent years,

[25] The ACCC estimated a DORC value for specialised aeronautical assets as at 1 July 2000 of $951 million. ACCC, *SACL: Aeronautical pricing proposal decision*, May 2001. This is lower than the book value of property plant and equipment at this time in the ACCC's monitoring accounts ($1.18 billion).

[26] These are adjusted to remove lease premiums (Brisbane, Perth, and Melbourne) and asset revaluations (Sydney).

[27] See PWC, *Has the trend line shifted? The impact on airport valuations*, 2015. PWC notes that: "…airport transactions in the past five years indicate that regional airports with higher traffic growth transact within a range of between 14 to 18 times EV/EBITDA, and larger, more mature airports transact within a range of 10 to 14 times EV/EBITDA."

PWC, https://www.pwc.com/gx/en/capital-projects-infrastructure/pdf/pwc-has-the-trend-line-shifted.pdf, accessed February 2018

reflecting a multiple of 14 times EBITDA.[28] Such a multiple is consistent with (slightly lower than) the sharemarket valuation of Sydney Airport as at June 2017 (when our analysis period concludes).[29]

- Recent Australian valuations for monopoly assets that are a not under formal price control indicate that much higher multiples would be appropriate: commentators have noted that ports sales around Australia have produced EV/EBITDA multiples of 25 or more.[30]
- Compared to European peers, Australian airports produce very high EBITDA margins (cash returns) because they are not subject to formal price control as are most privatised European airports.
- Applying a 14 times EV/EBITDA valuation to Melbourne, Perth and Brisbane airports would imply a market value to book value of tangible assets of close to 1 (Melbourne), and below 1 (Perth and Brisbane). This is implausible in the context of other information on margins and returns which we report (e.g relating to returns on assets).

For our market valuations for Melbourne, Perth and Brisbane airports, we apply the same EV/EBITDA valuation as for Sydney airport, using EBITDA, debt and cash figures from the monitoring reports.

We also cross-checked the reasonableness of these valuations against the growth assumptions implied by an earnings growth model.[31]

Table 3: Opening asset values

AIRPORT	AFTER-TAX EARNINGS 2016-17 $000	DISCOUNT RATE RANGE (POST-TAX) (%)	GROWTH RATE TO MEET ESTIMATED MARKET VALUE (%)	AVERAGE GROWTH IN AFTER-TAX EARNINGS, 2007-16 (%)
MELBOURNE	291,710	7.5-9.0	4.5-6.0	6.6
BRISBANE	167,527	7.5-9.0	4.8-6.3	6.6
PERTH	119,203	7.5-9.0	5.0-6.3	6.9

Source: ACCC Monitoring reports, Frontier Economics calculations

For example, with Melbourne's post tax profit of $291.7 million in 2016-17, the market valuation we ascribe can be justified if profits grow by 4.5% per year, assuming a 7.5% post tax discount rate, or 6.0% at a 9% discount rate. Melbourne's profits have grown at an average of 6.6% over the last ten years, showing that such a forecast seems plausible.[32]

[28] Macquarie Equities reports EV/EBITDA of between 21.1 and 22.9 for Sydney Aiport between 2013 and 2016 calendar years. See http://www.macquarie.com.au/dafiles/Internet/mgl/au/apps/retail-newsletter/docs/2017-03/SYD200317e.pdf

[29] Sydney Airport's share price was $6.94 on June 30, 2016, giving a market capitalisation of approximately $15.6 billion.

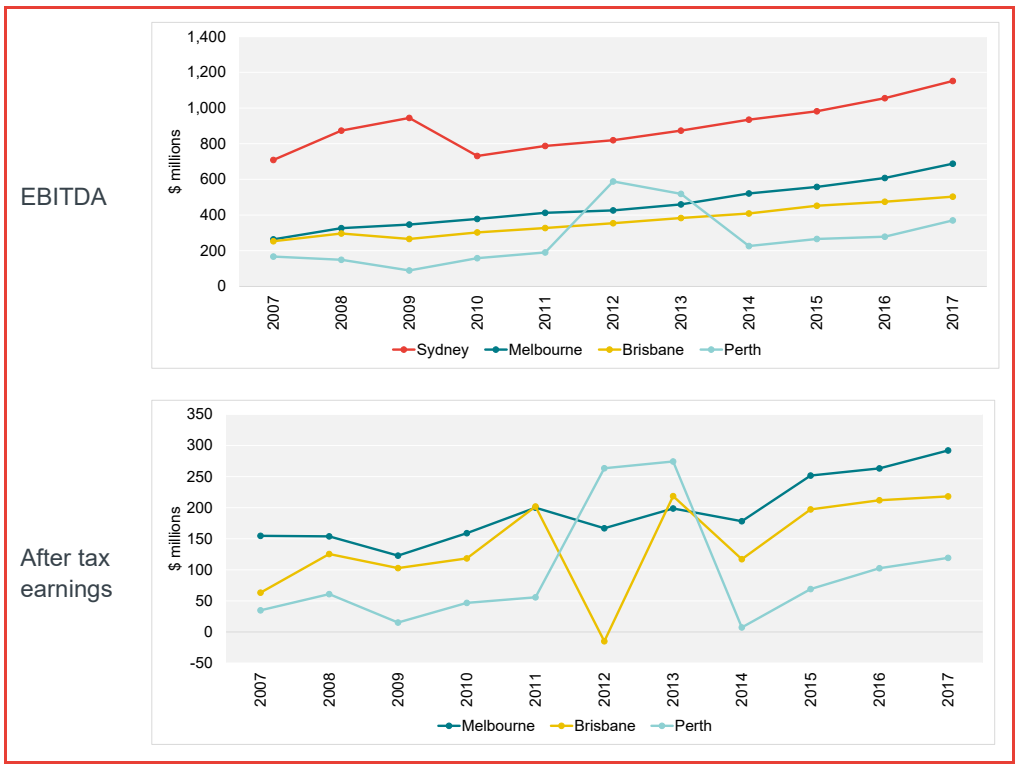
[30] https://www.bloomberg.com/gadfly/articles/2017-10-05/how-pension-funds-are-nickel-and-diming-australia

[31] An earnings growth model values an entity using the following formula: $Market\ value = \frac{annual\ earnings}{discount\ rate - growth\ rate}$.

[32] ACCC monitoring reports, various years. The profit growth is caused by factors pointed to earlier in this report – high fixed costs that do not vary with passenger numbers, and increasing passenger numbers.

The ACCC's monitoring data also shows that growth in EBITDA and after-tax earnings for the monitored airports is relatively stable, as per **Figure 8**. So, while we use the 2016/17 reported figures for the multiple estimate, it can be observed that these years are not unrepresentative.

Figure 8: EBITDA and after tax earnings for the monitored airports, FY2007-2017



Source: ACCC monitoring reports, various years
Notes: The spike in Perth's EBITDA/earnings is caused by an asset revaluation for non-aeronautical assets, which is accounted for as revenue

The market values used in the IRR analysis, based on the EV/EBITDA multiple, are reported in **Table 4**.

Table 4: Closing asset values

AIRPORT	FINAL YEAR FY	MARKET VALUE (END FY) $BN
SYDNEY	2017	15.95
MELBOURNE	2017	9.62
BRISBANE	2017	6.28
PERTH	2017	4.71

Source: ACCC monitoring reports, various years; Frontier Economics

The cost of capital

The determination of whether a company is making excessive returns requires the estimated IRR, or the proxy measures used, to be compared against a suitable benchmark. As we have noted, the estimated IRR can be compared against the entity's WACC over the relevant analysis period.

The output of the WACC calculation is a cost of capital estimate (or range) measured in percentage terms which can be compared with the IRR, also measured in percentage terms. It is important to ensure consistency and comparability between the profitability measure and the benchmark.

In our analysis, we use pre-tax nominal cashflows to calculate the IRR. Therefore, the WACC formulation must also be in a pre-tax nominal form. This is no longer the standard formulation used by regulators when setting a return on capital allowance – a vanilla WACC formulation is usually preferred, with explicit modelling of tax allowances as a separate building block item. The vanilla WACC is lower than a pre-tax WACC, because the cost of equity term within the vanilla WACC formulation is a post-tax rate, whereas it is a pre-tax rate in the pre-tax WACC formulation.

HoustonKemp's WACC estimate is described as follows:

> *We have adopted a conventional regulatory approach to estimating the reasonable range for the WACC for a benchmark provider of aeronautical services, and a form of WACC that is consistent with the accounts reported by the ACCC in its airport monitoring reports.*

HoustonKemp further clarifies that:

> *The purpose of the estimated WACC that we adopt for this comparison is not to provide an opinion on the likely cost of capital for any particular airport, but rather to identify the range of estimates that is reasonably able to be drawn from material readily available in the context of regulatory decisions on infrastructure pricing.*

HoustonKemp uses the following parameter values in its estimation of an upper and lower bound WACC.

Figure 9: HoustonKemp parameter values for nominal, pre-tax WACC

WACC component	Lower bond	Upper bound
Debt proportion	50%	60%
Equity proportion	50%	40%
Nominal risk-free rate (annual average)	10-yr annualised CGS	10-yr annualised CGS
Return on debt (annual average)	10-yr annualised BBB corporate debt	10-yr annualised BBB corporate debt
Market Risk Premium	5.50%	6.50%
Asset beta	0.6	0.7
Debt beta[111]	0.08	0.13
Equity beta	1.11	1.54
Corporate tax rate	30%	30%
Franking credits	0.50	0.25

Source: HoustonKemp report, p.31.

We concur with HoustonKemp that it is sensible to estimate a range of reasonable WACC values given uncertainty in the true parameter estimates. We do not provide a separate opinion on the appropriate upper and lower bounds, but to highlight the comparisons between our results, we use the same parameter values adopted by Houston Kemp in **Figure 9**.

We do note, however, that there may be an error in the above calculations, as the upper bound appearing the figures in the HoustonKemp report appears around 1.5% higher than could be justified by the inputs above.[33]

There are no recent independent regulatory decisions on a suitable WACC range for Australian airports. That said, the approach taken by HoustonKemp is conservative as airports would be expected to have a cost of capital that is below that of the average listed firm. This is because the airports we consider are natural monopolies, subject only to price monitoring, and are generally considered safe investments akin to other utility infrastructure.[34] With an equity beta of over one and using BBB-rated debt as benchmarks, the HoustonKemp derived-WACC is above the average market listed firm. We estimate the cost of debt for a firm that has the average risk of listed entities would have gearing (debt / (debt + equity)) of 41 per cent, using data over the 2017 calendar year. Using May 2018 data, we estimate that the average firm credit rating (weighted by market capitalisation) is most likely between A- and BBB+.

Ultimately, even using the range provided by HoustonKemp, there is evidence of excess returns.

[33] For example, if we take the year 2017, we calculate a return on equity of 16% and a cost of debt of 4.6%, which at the given gearing of 60% is a WACC of 9.1%, not around 11% as in the charts. For the lower bound, we calculate a WACC of 7.3% which is consistent with the charts.

[34] The WACC for each airport might also be expected to differ, to the extent that differences in passenger types, revenue sources, etc. affected the variability of returns.

E COMPARISON OF MARGINS ACROSS AIRPORTS

Margins corroborate principal results

For further corroboration of our main results, we compare margins earned by the monitored airports in Australia as against a selection of international airports.

EBITDA margins provide an indication of the cash-earning potential of the business. It is a useful indicator by which to compare airport profitability because it adjusts for airport size (revenues), and is not affected by how airports finance their operations, face different tax regimes, or depreciate their assets.

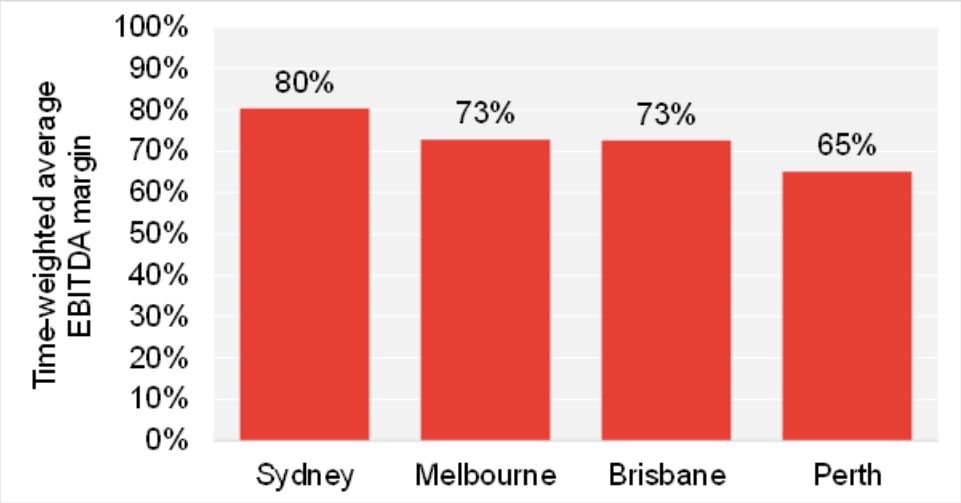
The primary issues with this profit measure are that:

a. suitable benchmark comparators must be found, being airports that are operating in (more) competitive markets, or are price regulated and

b. it does not account for the recovery of capital costs, which can distort the results if capital costs vary dramatically. However, this weakness can be overcome if the margins are persistent over a long enough time period.

In **Figure 10** we show margins for the period 2002-16 for the Australian monitored airports. Sydney's returns are the highest of the airports.

Figure 10: EBITDA margins, 2002-16



Source: Frontier Economics calculations

These returns are much higher than average EBITDA margins for firms in the economy[35], but this (partly) reflects the capital-intensive nature of airports' operations. To make some judgement about these margins, we need to identify suitable comparator airports. We have considered a range of information, including other benchmarking exercises, to determine suitable comparators. In particular, we considered

[35] As an example, Damodaran's dataset indicates United States economy-wide EBITDA margins of around 13 per cent. See: http://people.stern.nyu.edu/adamodar/New_Home_Page/datacurrent.html

a report for Melbourne Airport (Leigh Fisher)[36] and a report by PA Consulting for the CAA on Heathrow Airport comparisons.[37] Both exercises compared EBITDA margins and included Australian airports in the comparisons. Where possible, we obtained margin data for airports where they were included in either of these studies. This left us with 18 airports (14 other than the Australian airports). Of these airports:

- seven are under some form of price control (LHR, DUB, SIN, VIE, CDG, CPH, ZRH)
- eight are in Europe, four are in the Asia-Pacific region and two are in North America.

In **Figure 4** we reported the average margins for the period 2008-2015[38], with the Australian results also included over the same period. The margins illustrate that:

- all of the monitored Australian airports have average EBITDA margins well above the average margin (excluding the Australian airports)
- in comparison to **Figure 10**, it also illustrates that margins are not declining (as average margins are higher over 2008 onwards compared to 2002 onwards)
- Only Auckland airport, which is regulated in a similar manner to the Australian airports, earns margins as high as those in Sydney, Melbourne and Brisbane (with Perth's margin 6th).

To further assess whether differences in EBITDA margins could be due to different stages of the investment cycle (i.e. high investment leading to high capital charges), we also calculated EBIT margins for the same airports.

It is apparent from these data (**Figure 5**) that:

- average EBIT margins at all the Australian monitored airports, at between 60-64 per cent are extraordinarily high by international standards (average 29 per cent). Only Auckland – another airport subject to price monitoring – has margins comparable to the Australian airports.
- the high EBITDA margins cannot obviously be justified by comparatively high capital investment, as EBIT margins are also relatively high. Sydney's higher relative depreciation charges narrow the gap with other Australian airports, but still leave its margins the highest in the comparator set.

We consider that these comparisons provide further support for the conclusion that the earnings of the Australian airports are consistent with the exercise of market power.

[36] Leigh Fisher, *Melbourne Airport Performance And Charges Benchmarking Study*: *Prepared for Melbourne Airport*, April 2011.

[37] PA Consulting, *CAA*: *Benchmarking Of High Level Economic And Financial Metrics Of Heathrow Airport*, June 2017

[38] We have insufficient data across all comparator airports for the 2016 year.

F GRATTAN ANALYSIS OF RETURN ON EQUITY

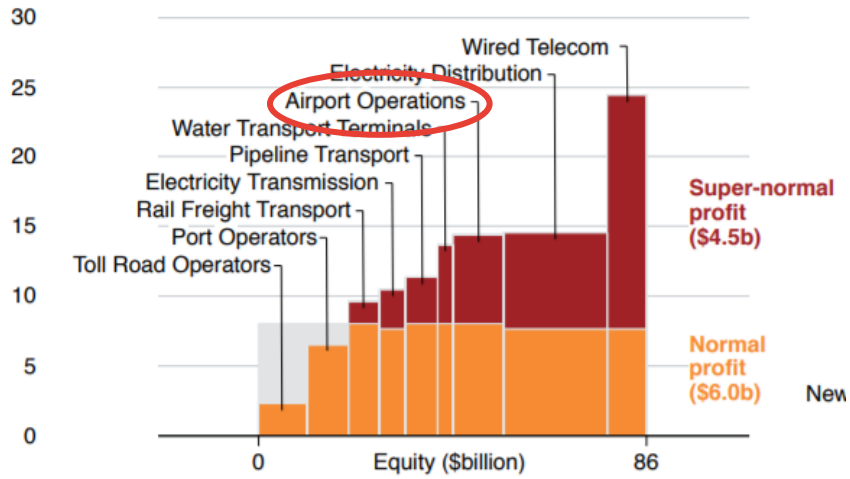
In 2017, the Grattan Institute produced a report on competition in the Australian economy.[39] It noted that many people around the world have become concerned that competition is not working as it should. The purpose of the report was to determine whether these concerns were relevant to Australia – in particular, whether competitive intensity is too low in Australia, and is it declining? This included the determination of sectors in which firms with market power earned high profits.

Airports formed part of the "natural monopoly" sector, which was considered "particularly profitable" overall (p. 32). Grattan concluded that "nearly half of returns earned by airport operators were super-normal profits, on average, from 2010-11 to 2015-16." (p. 32).

The Grattan Institute used as its profit measure return on equity – after tax profits divided by shareholder's equity. This should be compared with the cost of equity to determine whether returns to equity holders are indicative of the exercise of market power.

As illustrated in Figure 4.4 from the Grattan report (replicated below), post-tax returns of 14.4 per cent compared to a post-tax cost of equity of 8.0 per cent. This converts to a pre-tax return of around 17 per cent. HoustonKemp's estimated post-tax cost of equity over the same period is around 10 per cent.

Figure 11: Extract from Grattan report



Source: Grattan Institute

[39] See https://grattan.edu.au/report/competition-in-the-australian-economy/ Jim Minifie, Cameron Chisholm, and Lucy Percival. (2017). *Competition in Australia: Too little of a good thing?*. Grattan Institute.

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