



04 August 2016

Keston Ruxton
Manager IM Review
Commerce Commission New Zealand
Email: regulation.branch@comcom.govt.nz

Dear Keston,

SUBJECT: SUBMISSION ON DRAFT DECISION PAPERS AND REPORT ON THE IM REVIEW

The International Air Transport Association (IATA) represents some 265 airlines comprising 83% of total air traffic. Air New Zealand and other major scheduled airlines operating to the three major international airports in New Zealand are members of IATA.

IATA welcomes the opportunity to submit its comments for consideration by the Commerce Commission. Our comments are from an international perspective and are based on the requirements of, and practices in, international civil aviation. IATA remains convinced that Information Disclosure (ID) in New Zealand is not delivering the needed outcomes for consumers. For purposes of this submission we will put aside our broader concerns and instead focus on the technical aspects under consideration in the consultation by the Commerce Commission on Input Methodologies (IM) and issues identified in topic paper 5 (airport profitability).

IATA supports the submission made by BARNZ to the Commerce Commission and would like to complement further by providing general and specific comments to a select number of issues raised in the consultation document with a focus on the following conceptual points:

Issue 1: Further guidelines for IM and ID are needed to enable assessment of airport performance

IATA welcomes all steps taken to increase transparency in the ID framework and IM to make it easier to assess airport profitability. As previously expressed by IATA¹, the regulatory framework in New Zealand aligns incentives for airports in a way that is not in the interest of consumers. Under the current framework, if airports in New Zealand are too profitable they risk being targeted for further regulation. In the absence of focusing on performance metrics (in addition to airport profitability) there is a risk that poor airport performance will go unaddressed. Monitoring needs to be strengthened due to the following concerns over airport incentive structure:

- Efficiency and quality of service: Airports have an incentive to improve efficiency if the improvements translate to increased profitability. Since excessive profitability, even if it is driven by productivity improvement, can expose the airport to further regulation, airports are incentivized to moderate

¹ IATA submission to MBIE on “Effectiveness of Information Disclosure Regulation for Major International Airports” November, 2014 in Appendix A.



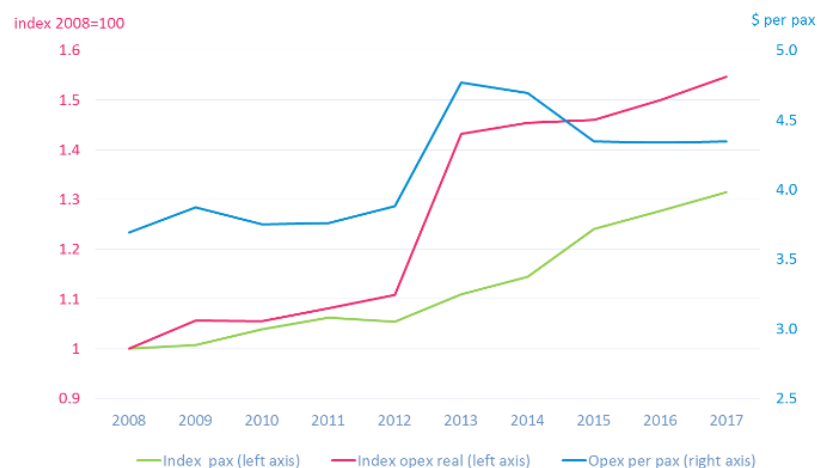
efficiency improvements so as to avoid exceeding the “acceptable” level of return.

- Innovation and investment: Incentives for airports to innovate and invest are limited to the point where such measures do not exceed the “acceptable” level of return.
- Sharing of efficiency gains with consumers: Airports have an incentive to capture all the efficiency gains rather than pass them on to consumers. The presence of market power will serve as an enabling factor for capturing those gains by the airports.

IATA’s high-level assessment of the performance of airports in New Zealand supports the assertion that airport behaviour has been influenced by the above mentioned incentives. Our firm view is that it is likely that this is already resulting in suboptimal outcomes for consumers. IATA accepts that more detailed analysis is needed to fully assess airport performance and urges the Commission to develop further guidelines for ID and IM that will enable more detailed monitoring and assessment of the relevant airport performance metrics.

One of the key findings of the IATA analysis is that operating expenditure in real terms has increased at a faster pace than passenger growth at both Auckland and Wellington airports. The charts below present the forecast operating expenditure on a per passenger basis and based on normalized (indexed) comparisons of growth in passengers and operating expenditure. These developments suggest a decreasing efficiency in OPEX.² The increase in real operating expenditure per passenger is particularly surprising at Wellington airport as generally airports of this size exhibit strong economies of scale.

OPEX performance 2008-2017 AIAL

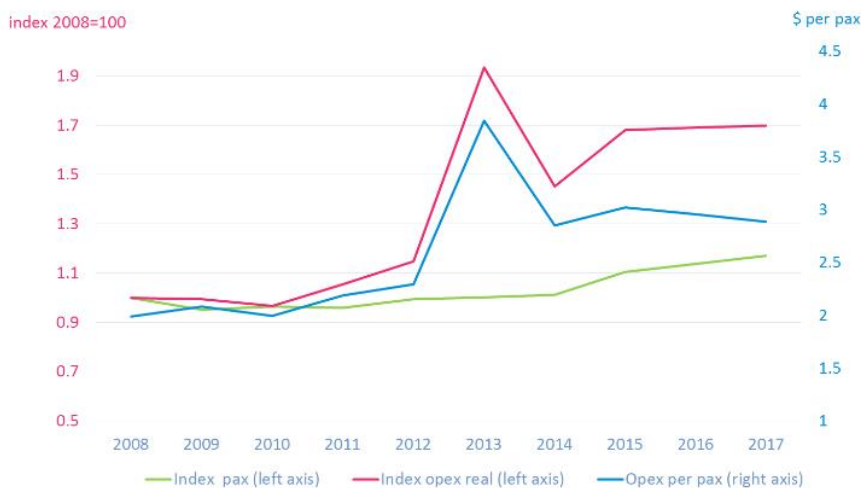


Source: NZ Commerce Commission, RBNZ, IATA, ACI

² It is difficult to ascertain whether there are objective factors that may explain the decrease in OPEX cost efficiency. However, the general plateauing in customer satisfaction over the past three years (as per data communicated under schedule 14) suggest that increasing quality of service is not a factor that can explain the worse OPEX cost efficiency.



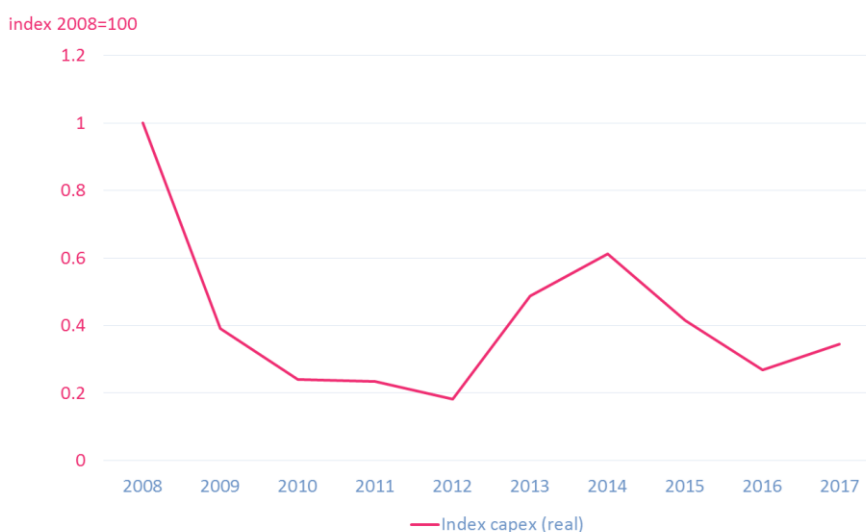
OPEX performance 2008-2017 WIAL



Source: NZ Commerce Commission, RBNZ, IATA, ACI

Other developments also raise concerns. The decreasing trend in forecast CAPEX expenditure may come about as a result of airports deferring investment. Another potential explanation can come from the user community being successful at resisting new investments due to concerns that investments do not deliver value for money. This can arise either due to unattractive projects being put forward and/or due to poor efficiency in the delivery/execution of projects. While decreasing CAPEX does not provide definitive conclusions, it reinforces the above mentioned concerns given the structure of airport incentives.

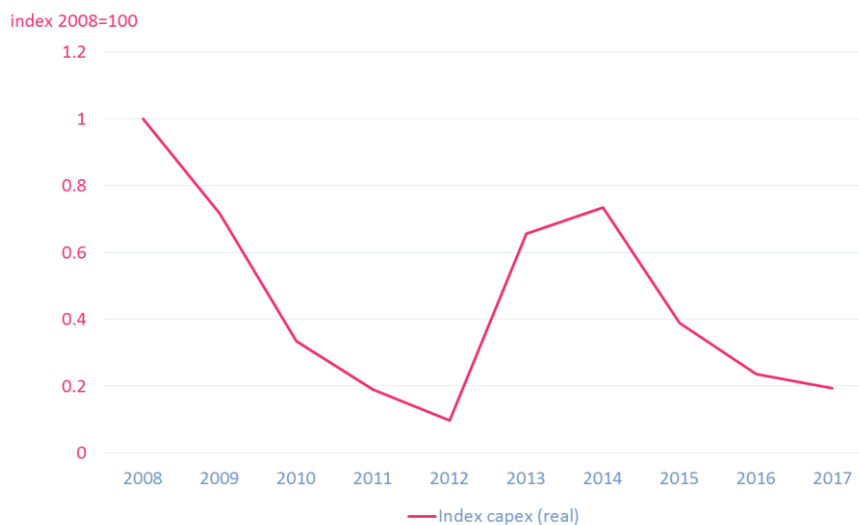
CAPEX performance 2008-2017 AIAL



Source: NZ Commerce Commission, RBNZ, IATA, ACI



CAPEX performance 2008-2017 WIAL



Source: NZ Commerce Commission, RBNZ, IATA, ACI

In this context, an immediate priority of the Commission must be to develop further guidance on how to assess whether CAPEX and OPEX is being incurred efficiently. Having clear guidelines as part of the ID and IM on what constitutes efficiently incurred CAPEX and OPEX can greatly help in measuring airport performance.

- CAPEX efficiency – ID and IM should include criteria that needs to be applied for assessing what CAPEX can enter the Regulated Asset Base (RAB). This criteria should also be complemented with detailed guidance to enable assessment of whether the right investments are made (scope efficiency) and whether investment are executed optimally (delivery efficiency).
- OPEX efficiency – ID and IM should include detailed guidance on how to present operational expenditure to make it easier to assess airport performance and monitor OPEX efficiency.

Issue 2: Depreciation

The draft IM modifications provide for principles to be applied when an airport decides to deviate from straight-line depreciation. Although the solution for providing principles for deviation is a positive step, compared to the existing situation, we fear that airports may still be incentivized to deviate from straight line and apply other methodologies that would further their own interests and not the interest of consumers (i.e. via accelerating depreciation).

There are some instances in which deviating from straight-line depreciation could be in the interest of consumers. For instance:

- An annuity approach could be adopted, in which the “depreciation + cost of capital” allowances are the same (in value) throughout the life of the asset. This is aimed



at spreading the associated costs of investments more evenly over time. This approach is applied in Dublin Airport.

- Furthermore, in cases of large capital projects in which there would a high degree of excess capacity in the first years of the assets being commissioned (i.e. a runway, a new terminal), the annuity approach could be adjusted by the actual utilization of the asset. This avoids spikes in charges when commissioning an asset when the customer base is low. This approach is applied in the case of Amsterdam Airport (5th runway) and Dublin Airport (T2).

However, we doubt that the airports will follow such approaches unless instructed to. In order to avoid perverse incentives by opening up the decision of the depreciation method to be made by airports, we would suggest that either:

- 1) IM specify that only the straight line methodology is used, or
- 2) If the Commerce Commission continues to allow for alternative approaches, that the principles (as per Table 5.1 in the Topic 5 paper) are amended to include a line that states that “*any deviation from straight line methodology should only be in benefits of consumers*”. It may be prudent that the Commerce Commission also complements this table of principles with guidance on methodologies that could be compliant with such principles.

Issue 3: Assets held for future use

IATA supports assets held for future use remaining outside the RAB. Allowing such costs to be incurred in advance of these assets coming into use constitutes a form of prefunding. An independent assessment of pre-funding has found that:

- Pre-funding is a product of regulation; it does not happen in competitive markets;
- Further, pre-funding is not common in the main regulated markets, such as energy and water;
- Where an operator has market power there is very little case for pre-funding as they face limited risks to revenue. Where an operator may lose market power, pre-funding leads to additional rather than advanced revenues.

The evidence³ shows that any future investments should be assessed in their own right and must have incremental financial benefits to cover their costs. Furthermore, we can say with confidence from our own experience that pre-funding does not exist elsewhere in aviation. Passengers do not pay extra to fund future aircraft purchases.

Issue 4: Treatment of asset revaluations

The use of asset revaluation tactic to inflate cost base (and thus higher prices) should not be permitted as it results in windfall gains at the expense of the users – airlines

³ “An Assessment of the Use of Pre-funding for Airport Capacity Expansion Scheme”, First Economics, January 2015 in Appendix B.



and passengers. We have seen how returns in reported assets varied and reported results affected by significant upward revaluations of asset values by some airports. Airports continue to use these inflated asset values to artificially portray a low rate of return in an attempt to justify increase in charges.

Airlines should not pay for investment value of land and infrastructure used by airports. As per International Civil Aviation Organization (ICAO) guidance, the charges paid by airlines should reflect the operational cost of using the land to provide aeronautical services and not its market value. ICAO further recognizes that land is a store of value for airports, unlike depreciating assets such as terminal buildings, as it does not deteriorate and its useful life is not limited.

IATA believes that an increase in land and infrastructure values based on the application of an alternative use (i.e. opportunity cost) valuation is:

1. Inefficient: It overvalues the cost of the service provided by the asset in its operational use, penalizing airlines and their passengers. Allowing airports to artificially increase the value of their assets and the return they receive on it does not create any clear incentives for greater efficiency in the use of these assets.
2. Unfair: It merely creates unearned returns (i.e. windfall gains). Airlines should only pay for the services an airport provides. In other words, airlines should not pay higher charges for using the same asset simply because the investment value has changed.
3. Impractical: When there is no feasible alternative use, the opportunity cost valuation has no clear basis. In the vast majority of cases, much of aeronautical land or infrastructure is either designated for aviation use or impractical for other uses. Indeed with respect to land, it is often leased rather than owned by the Airport Company.
4. Not standard practice: Adjustments to charges based on unearned land or infrastructure value appreciations are not in line with ICAO's provisions. Land and asset revaluations are not a factor in the pricing decisions of firms operating in competitive markets. It is also important to note that the revaluation of land to reflect higher surrounding property values (and therefore a higher opportunity cost of land use) is **not** standard regulatory practice elsewhere.

We remain at your disposal to answer any of the points raised in this submission.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Richard TAN", written in a cursive style.

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APPENDIX A



28 November 2014

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EFFECTIVENESS OF INFORMATION DISCLOSURE REGULATION FOR MAJOR INTERNATIONAL AIRPORTS

The International Air Transport Association (IATA) represents some 240 airlines comprising 84% of total air traffic. The major scheduled airlines operating to the three major international airports in New Zealand are members of IATA. IATA is in a position to provide an international perspective on the effectiveness of information disclosure regulation for major international airports in New Zealand.

IATA is aware of a submission made by the Board of Airline Representatives New Zealand (BARNZ) on this consultation and supports the views expressed by BARNZ in its written submission. Additionally, IATA is supplementing BARNZ's comments with views drawn from its international experience and recognized research on economic regulation.

IATA's submission will provide general comments on economic regulation followed by a response to three of the questions posed in the document entitled 'Effectiveness of information disclosure regulation for major international airports'. IATA has chosen to respond to these questions where it considers its international experience can best support deliberation in New Zealand with regards to effectiveness of information disclosure regulation for major international airports. The three questions are:

1. In areas where the Commission has been unable to draw a conclusion on the effectiveness of information disclosure, do you consider it likely that conclusions would be able to be drawn in the future?
2. Is information disclosure for major international airports working effectively to achieve the objectives in Part 4 of the Commerce Act?
3. Do you have any comments on how the requirement to consult on capital expenditure in section 4C of the AAA fits into the overall regulatory regime for major international airports?

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General comments on economic regulation

- Generally, major airports should be assumed to have significant market power unless it can be demonstrated otherwise through an assessment such as a market power assessment.
- Major airports have significant market power as the confluence of characteristics such as capital intensiveness, economies of scale and permit requirements combined with strong passenger preference for airports in close proximity and high switching costs of airlines allow the airport to be in a dominant position and impact the efficient functioning of air transport markets.
- IATA has not undertaken market power assessments for each of the three major international airports in New Zealand but considers that the characteristics and prevailing conditions at these airports point to them as having significant market power.
- It has sometimes been argued that airports are incentivized to keep charges low to increase passenger throughput so that non-aeronautical revenues can be maximized. This is based on the view that airports are a two-sided platform where the incentive to increase revenues on one side of the platform is sufficiently strong to keep prices low on the other side - therefore, economic regulation is not necessary. But this view is secondary to the issue of market power. Even if one were to accept airports as two-sided markets, there is nothing to suggest that increasing revenue on one side of the platform would necessarily lead to lower prices on the other. Market power can exist on either or both sides of the platform. Therefore, the need for regulation of aeronautical charges at a dual or hybrid till airport is just as relevant, if not more so, as under a single-till regulatory framework.
- In the presence of market power, regulatory intervention is needed to ensure consumer interests are safeguarded while allowing for the efficient functioning of the market. Robust independent economic regulation can provide the needed incentives for efficiency in operations, investment and pricing combined with fair returns for investors.
- Robust independent economic regulation needs to comprise of the following criteria:
 - Independence – regulators need to have clear objectives and autonomy to take decision to implement objectives.
 - Transparency – over the process for regulatory decision and the expenditure and investment plans of a regulated company.
 - Full and timely consultation with airport users that is open and constructive.

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- Adequate length of agreement – regulatory reviews should cover sufficient period of time (4-5 years) to give certainty and opportunity to extract cost efficiency.
- Flexibility – ability to adapt to external shocks.
- A neutral dispute settlement mechanism – an appeal process against the regulator’s decisions
- Transparency is provided in the regulatory approach in New Zealand through information disclosure.
- On independence, the Commerce Commission serves as an independent body in the regulatory process albeit playing a relatively passive role.
- Other key elements of full and timely consultation, length of agreement and flexibility are left to the functioning of the market. Information disclosure attempts to provide sufficient transparency to allow for proper functioning of the market given the ex-post threat of further regulation. While IATA accepts that the market can define these three elements, we disagree that this approach will deliver efficient outcomes or is in the interest of airport users.
- A dispute settlement mechanism or appeal process is not something that can be delivered by the market and is an element missing from the regulatory framework employed in New Zealand.
- IATA does not consider the specific ex-post mechanism employed in New Zealand to be able to deliver efficient outcomes. However, putting aside consideration of other ex-post mechanisms, we are of the view that introducing ex-ante elements to the existing regulatory framework such as putting in place cost-effective arbitration can help deliver better outcomes.

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In areas where the Commission has been unable to draw a conclusion on the effectiveness of information disclosure, do you consider it likely that conclusions would be able to be drawn in the future?

- IATA does not consider that conclusions would be able to be drawn in the future if the current framework for assessing information disclosure continues to be used. In order to assess the effectiveness of information disclosure, the assessment framework needs to develop more robust counterfactuals or alternatively assess the airports based purely on objective measures, for example through benchmarking the performance of New Zealand's major airports against comparable international airports. The current framework does contain an objective measure for assessing an element of the Part 4 criteria, as evidenced by the approach employed to assess the effectiveness of information disclosure in limiting the ability of the airport to extract excessive profits. There is scope to develop more objective measures in the current framework.
- The approach taken by the Commission in assessing the effectiveness of information disclosure provides conclusions that are in sharp contradiction to the structure of incentives under the current regulatory framework, as elaborated below.
 - Innovation and investment: Airports have an incentive to innovate and invest only if it translates to increasing their profitability. However, under the current framework, if airports in New Zealand are too profitable they risk being targeted for further regulation. Therefore, incentives to innovate and invest will be limited to the point where such measures do not exceed the "acceptable" level of return. Furthermore, if airports find it easier to increase profitability by abusing their market power rather than innovating and investing, they will opt for the easier option.
 - Efficiency and quality of service: Similarly, airports will only have an incentive to improve efficiency if the improvements translate to increased profitability. Since excessive profitability, even if it is driven by productivity improvement, can expose the airport to further regulation, airports are incentivized to moderate efficiency improvements so as to avoid exceeding the "acceptable" level of return. On service quality, information disclosure alone may not be sufficient to enable constructive consultation between airports and airlines that can ensure the airport is responding to consumer needs.
 - Sharing of efficiency gains with consumers: Airports have an incentive to capture all efficiency gains rather than pass them on to consumers. The presence of market power will serve as an enabling factor for capturing those gains by the airports.

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- Excessive profits: The main reason the findings of the Commerce Commission were conclusive was because of the presence of an objective benchmark chosen against which to assess the performance of an information disclosure regime. Information disclosure can reveal whether airports are generating or expected to generate excessive profits, which if combined with a credible threat of further regulation, can serve to curtail excessive profit taking.

The existence of these incentives further underlines the importance of having objective measures to assess whether the scheme is delivering the efficient outcomes envisioned under Part 4.

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Is information disclosure for major international airports working effectively to achieve the objectives in Part 4 of the Commerce Act?

- The Commerce Commission in the course of the s56g review process concluded that Wellington and Christchurch airports were targeting excessive profits. Auckland airport was targeting above normal returns which falls just within the upper boundary of the Commission's acceptable WACC range. These conclusions leave no doubt that information disclosure for major international airports has not been effective in achieving the objectives in Part 4 of the Commerce Act.
- In the presence of market power, using light touch regulation can lead to inefficient charges as well as misdirected, excessive or insufficient provision of capacity and/or service. Economic theory and international experience suggest that in addition to excessive pricing, it is likely that the regulatory approach in New Zealand will have adverse effects on efficiency of investment and may have led to unrealized potential in driving efficiency improvements in operations.
- Below is a summary of international experience that has direct relevance for assessing the effectiveness of relying on information disclosure:
 - Inefficient charges level
 - If there is no cap on aggregate revenues, the airport will be incentivized to leverage its market power to maximize profits (as the cases in New Zealand have demonstrated). Oversight is essential over entities with market power and should in general take the form of direct economic regulation. If direct economic regulation is not deemed appropriate, a credible threat of further regulation complemented by a cost-effective dispute resolution mechanism (arbiter) between the airport and airlines is essential.
 - However, even in cases where allowable total revenues are capped, if the airport retains flexibility to set individual charges it will likely lead to strategic behaviour by the airport and inefficient individual charge levels. This strategic airport bias can result in inefficient development of the air transport network for example through propping up inefficient carriers. A case in point is London Gatwick Airport in the United Kingdom where airlines were compelled to enter into bilateral agreements with the airport with little ability to influence service levels. For some airlines, airport charges may actually rise to compensate the discounts offered to other airlines.

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- Too much or the 'wrong' investment
 - If airports do not need to agree their investment plans with regulators and airport users, there is increased risk that these investments don't adequately address or are not aligned to the needs of airport users. In the absence of regulation, the prevalence of market power by airports over airport users means that the consultation process over investment choices is unlikely to be balanced or effective. An example is in Rome where a long term contract was agreed between the State and the airport which envisaged a series of investments not required by the users.
- Service provided by airports may not reflect market demand
 - Another risk is that airports do not adequately respond to demands of service levels by airport users. For example, airports may allow service quality to fall (by cutting corners) in order for it to potentially generate windfall profits. In Australia, the Australian Competition and Consumer Commission (ACCC) suggested that Sydney airport had increased its profits by running down the quality of its services. It found that the airport had low responsiveness to concerns on delivery and quality of aeronautical services.
- Impact when capacity is constrained
 - In the long term, under light handed regulation, investment in increasing capacity is likely to be neglected. As investments in increasing capacity are deferred, rents are likely to increase because of scarcity. In such cases the airport, would be in a position to gain higher profits.



Do you have any comments on how the requirement to consult on capital expenditure in section 4C of the AAA fits into the overall regulatory regime for major international airports?

- Having consultations prior to decisions on any major capital expenditure is an important process as it can ensure that investments are being identified that are required to meet user needs. Furthermore, international experience has shown time and again that through constructive dialogue, airports and airlines can bring together their operational insights and business needs to drive cost effective ways of achieving desired performance levels and improvements.
- Central to effective consultation is an equal level dialogue between airlines and airports which is currently not the case in New Zealand. Strengthening the effectiveness of the consultation process in New Zealand is much needed.

Yours sincerely

A handwritten signature in blue ink, appearing to read "Malvyn Tan", written over a horizontal line.

Malvyn Tan
Lead – Airport Charges and Fuel
Asia Pacific

A handwritten signature in blue ink, appearing to read "G. Anjaparidze", written over a horizontal line.

George Anjaparidze
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APPENDIX B

**An Assessment of the Use of Pre-funding
for Airport Capacity Expansion Schemes**

**A report prepared for IATA, easyJet, TUI Travel
and Virgin Atlantic Airways**

January 2015

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ECONOMICS**

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Executive Summary

- This report examines the choices that there can be around funding profiles for new airport capacity, particularly the choice that decision-makers sometimes face about whether to ask users to pre-fund investments during construction.

Parallels to other markets

- The first task that we undertook in the study involved surveying infrastructure funding profiles in a range of different industries. The key finding was that in industries where infrastructure is delivered via competitive markets, firms invest in anticipation of being able to collect sufficient revenue from users when assets come into service and do not typically have access to pre-funding.

Purpose of pre-funding airport capacity expansion

- This led us to consider in greater detail why user pre-funding is sometimes proposed for airport developments. The paper highlights that it is helpful to think of two distinct types of pre-funding:
 - additional revenues – i.e. additional charges during the construction phase of a project, to supplement the revenues that the airport is able to collect when assets are in operation; and
 - advancement of revenues – i.e. the bringing forward of revenues that an airport would otherwise collect from users only after new assets open.
- Pre-funding will naturally tend to take the form of additional revenues when the airport that is investing in new capacity will not have significant market power (SMP) over the long term. An airport with this character will not be subject to perpetual economic regulation but will instead become a price-taker, either upon injecting new capacity into the market or thereafter. As such, pre-funding acts first and foremost as a supplement to the revenues that new assets will be able to generate in the competitive market.
- The logic for allowing an airport additional revenues lies in the way in which additional pre-funding can serve to bring down break-even volumes and charges for a project to a more attainable level. When this impacts positively on investors' perceptions of risk, pre-funding can potentially reduce a scheme's cost of capital and hence reduce scheme financing costs. In some situations, it could be that the consequent reduction in the overall cost of a scheme means that an otherwise unviable project becomes viable.
- When an airport has enduring SMP, an airport knows it has scope to price independently from the market and is likely to worry less about cost recovery and 'stranding' risks. This means that it is unlikely to see the same sort of cost of capital benefit from pre-funding.
- There may, however, be a case for revenue advancement at such airports in order to reduce equity and debt financing requirements. Every pound that can be collected from users during construction is a pound that the airport does not have to raise in the financial markets. If an airport is already having to raise a large amount of finance in a short space of time to cover capital costs, any alleviation of capital market capacity constraints may be judged to be of value (if these constraints cannot be addressed by other means).



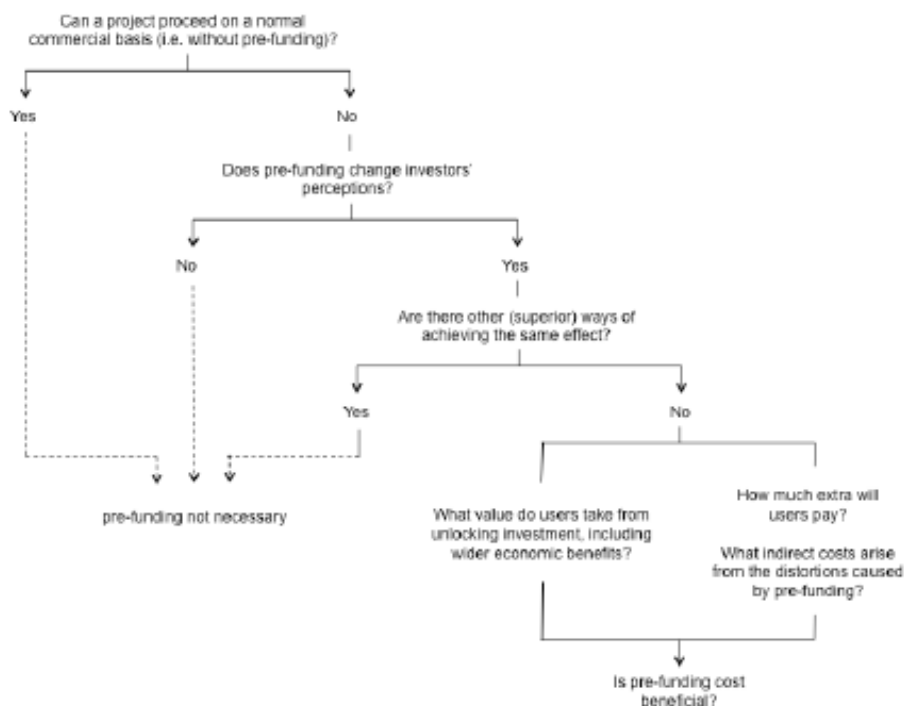
Cost-benefit analysis

- Armed with an understanding of what it is that pre-funding does to a project's economics, the choice that a regulator faces about whether to allow for additional revenues and/or advancement of revenues turns on whether the benefits to users exceed the costs.
- Costs that need to be factored into this type of assessment include:
 - the direct financial burden that additional charges place on users;
 - inter-generational effects that may arise if the individual users that pay the higher charges are not around to benefit when assets enter operation, or if users have high discount rates and place much greater value on money today in comparison to service tomorrow; and
 - distortions that can come from setting non-cost-reflective prices.
- Set against this, and as noted above, there can be benefits in pre-funding if early revenues permit a scheme to go ahead where it would otherwise not be commercially viable. These benefits may be amplified still further if new capacity brings wider economic benefits to the communities that the airport serves.

Conclusion

- The purpose of this study was not to opine on the merits of pre-funding for any specific airport development. The discussion in this paper instead brings out the tests that a decision-maker ought to apply when considering the pros and cons of pre-funding. They are broadly as follows.

Figure A: Pre-funding tests





1. Introduction

First Economics has been commissioned by a consortium of easyJet, IATA, TUI and Virgin to prepare a report on the pre-funding of investment in the UK.

The study is particularly relevant at a time when the Airports Commission has been tasked by the government with identifying and recommending options for maintaining the UK's status as an international hub for aviation. Most of the debate to date has been focused on identifying where a new runway should go, however there are also important unresolved questions about how any new investment is to be funded.

The CAA, as economic regulator, is ultimately responsible for making a decision on whether to allow pre-funding. It has a primary duty in law to further the interests of users of air transport services (i.e. passengers and cargo carriers). In this context, the CAA has published: (i) a discussion paper¹ on the regulatory treatment of issues associated with airport capacity expansion; and (ii) a draft policy statement² on the economic regulation of new runway capacity.

1.1 The economic implications of pre-funding

Pre-funding in the context of this study refers to the ability of a firm to collect revenues from its customers to pay for part of a future investment before customers are able to enjoy the use of the new assets. For example, it could be that an airport levies an additional charge on its existing users to help pay for new airport infrastructure such as a new runway or terminal building.

In the context of UK airport regulation, the issue of pre-funding has been considered extensively in the past, e.g. in relation to the development of Terminal 5 at Heathrow Airport and by the respondents to the CAA's most recent consultation.

As part of these debates, arguments in favour of pre-funding are generally that it is necessary to ensure there are sufficient cashflows to support upfront costs related to design and construction, which, in the case of large projects such as a new runway or terminal capacity, can run to billions of pounds. The suggestion is that this pre-funding can lower the cost of new investments, perhaps going as far as to make schemes viable when they might not otherwise be supported by private investors.

On the other hand, the counterarguments have been that pre-funding leads to a number of unacceptable distortions, including that it:

- represents a departure from the price path that would be observed in competitive markets, where market forces act to prevent companies from charging for goods and services they do not yet provide;
- raises inter-generational equity concerns because current users will be paying for facilities that will primarily be enjoyed by future users;
- can negatively impact on the incentives of the airport to actually deliver the investment at an efficient cost and within a timeframe that is consistent with the original plan;
- may inappropriately transfer risk associated with the investment from the airport to the airlines currently using its services; and
- can distort competition between rival airlines.

¹ http://www.caa.co.uk/docs/78/CAP1195_capacity_expansion_discussion_paper.pdf

² <http://www.caa.co.uk/docs/2888/CAP1221.pdf>



1.2 Structure of this report

This report is intended to be a contribution to continuing discussions among the CAA, the Airports Commission, airports, airlines, users and government. It may also be of use to decision-makers in other countries that have to confront decisions about pre-funding now or in the future.

The paper seeks to further the debate in three main ways:

- section 2 looks at the parallels that can be made to the funding of infrastructure investments in other settings, focusing especially on what may be learned by observing price and funding profiles in competitive industries;
- in section 3 we highlight the important distinction between additional revenues and advancement of revenues and show that pre-funding will have fundamentally different character and effects at (i) an airport that is expected to have significant market power (SMP) over a long horizon and (ii) an airport that does not. In doing so, we think we identify what ultimately it is that pre-funding does to a project's economics; and
- in section 4 we respond to the CAA's suggestion that it would allow for pre-funding if it were to be satisfied that the benefits to users exceed the costs by setting out in greater detail what the inputs into this cost-benefit analysis should be.



2. Parallels to Other Markets

One of the perspectives that can be helpful in discussions about pre-funding involves reading across to funding profiles for large infrastructure investments made in other settings.

As part of this study, we were asked to carry out a survey of experiences in a broad range of industries. We did this by looking at:

- infrastructure investment in competitive markets;
- stand-alone, discrete, investments in regulated sectors; and
- unregulated UK infrastructure projects.

The detailed results of this survey are given in the appendix.

In this section we first set out the conclusions that we think we can draw from this analysis before making some more general comments about the usefulness of the comparisons.

2.1 Survey

An overall summary of the case studies that we considered is given in table 1.

Table 1: Summary of funding approaches in infrastructure industries

	Cost of build	Does the investment have an existing customer base?	Do users pre-fund investment in advance of assets coming into operation?	Is advanced funding made available by other stakeholders?
<i>Infrastructure investments in competitive markets</i>				
Power stations	-	✓	X	X
4G mobile networks	-	✓	X	X
<i>Discrete investments in regulated sectors</i>				
Large onshore transmission projects	tbc	✓	✓	X
OFTOs	£2bn+	✓	X	X
Thames Tideway Tunnel	£4.2bn	✓	✓	X
Northern Ireland gas networks	£200m	✓	X	✓
Heathrow T5	£4.6bn	✓	✓	X
Dublin Airport T2	€0.8bn	✓	X	X
<i>Investments in the unregulated transport sectors</i>				
M6 Toll Road	£0.9bn	X	X	X
High Speed One	£5.8bn	X	X	✓
Crossrail	£14.5bn	X	X	✓

We offer the following observations.

Infrastructure investments in competitive markets

To our mind, the case studies involving private-sector investments in competitive markets constitute by far the most interesting and relevant part of the survey.



In the two industries that we have considered, it is very clear that funding profiles provide for revenue to come in only when new assets are working and providing a service to customers. The scale of investment in both of these cases can be significant – new power stations can cost firms and their investors up to £1-2 billion, while total industry investment in 4G networks has probably been in the range £5-10 billion.

We think that the power station case study is especially relevant, as an illustration of the way in which investment comes forward in response to price signals in competitive markets. When capacity margins in the sector have become tight, market prices during periods of high demand have moved upwards, giving additional revenues and additional returns to generators. This in turn has attracted new entry into the market, on the basis that higher prices make it possible for a new plant to recover its costs. Crucially, investors have come into the market without any pre-funding – new plant has earned revenues only when it has been able to sell electricity into the market.

This principle has remained intact as the government has sought recently to encourage entry and capacity expansion within the industry. (The perception has been that market price signals have not been as sharp as they ought to be, and there has also been a suggestion that investors have been increasingly put off by regulatory and political risk.) Policy initiatives have focused on giving new entrants greater revenue certainty – in the form of capacity payments and contracts for differences – where, naturally, the revenue in question is the revenue that the plants can collect when they are capable of generating electricity. To our knowledge, there has never been any suggestion that the government or the regulator should facilitate investment in new capacity by providing for some form of customer pre-funding.

Discrete, stand-alone infrastructure projects in regulated industries

The picture in regulated industries is more mixed – for each example in which we can identify an element of pre-funding (e.g. Terminal 5 at Heathrow Airport) there is a near-identical case study in which the regulator ruled against pre-funding (e.g. Terminal 2 at Dublin Airport).

It is unclear what one should make of this. It is important to recognise that the economic and financial frameworks for investment in regulated sectors tend to be the product of conscious regulatory design, rather than the natural operation of the market, and perhaps the message to take is that the decision about whether or not to allow pre-funding has been a judgment call from each individual regulator made with regard to their specific duties and the specific circumstances of the industry in question. As such, it is difficult to say that the CAA (in the current debate about pre-funding of airport capacity in the south east of England), or another decision-maker (in the case of future capacity expansion elsewhere), should make the same choice as one or other of its peers due to reasons of “precedent”.

Discrete, stand-alone infrastructure projects in the unregulated transport sectors

The examples that we have of stand-alone transport infrastructure projects in unregulated settings all very clearly did not involve pre-funding by users. Instead, it is noticeable that in the two rail infrastructure³ examples – HS1 and Crossrail – advanced funding came from other sources, including government and local businesses.

Given the involvement of government in these case studies, and the way in which decisions about pre-funding again amount to policymaker’s choice rather than the natural operation of

³ NB we have classified these two projects as unregulated as at the time of their construction they were governed under separate legislation from the national rail network and were not, therefore, subject to detailed economic regulation under the regime the ORR uses to regulate Network Rail’s assets.



a market, we are similarly unsure that there is a clear takeaway. That being said, it is of interest that a range of large projects have been able to proceed without user pre-funding.

Conclusion

The survey that we carried out shows there have been different experiences in different sectors. However, after putting to one side funding profiles that are the product of regulatory or government design, we think that we have obtained insights of genuine value from the case studies involving competitive markets.

The message that we take is that pre-funding is not 'normal'. It is true that some regulators have provided for NPV-neutral pre-funding in monopoly industries, but this appears to be a departure from what happens in competitive markets rather than mimicry of the competitive process.

2.2 Other observations

Our conclusion leads us to make the following additional comments.

2.2.1 Interpretation of price increases in competitive markets

The CAA has made reference in its recent consultation documents to the sort of price profiles that we pick out in our power station case study. On occasion, the CAA has suggested, on the basis of such parallels, that "pre-funding arises through the natural operation of a market".⁴

We think it is important to take issue with this statement. Whilst we can agree that, when capacity becomes scarce, price increases arise through the natural operation of a market, it goes too far to say that this represents pre-funding. A more accurate characterisation is that:

- price increases across the market mean that all existing firms earn higher revenues and higher profits;
- it will eventually start to become apparent that incumbents are earning returns in excess of their cost of capital; and
- this will signal to both existing firms and new entrants that it might be profitable to inject new capacity into the market. Specifically, there can be an expectation that, even if prices drop when new capacity comes on stream, there is sufficient headroom in current prices that the new capacity will still be able to earn revenues sufficient to cover both operating and capital costs over the life of the built assets.

Price increases are therefore first and foremost price signals. That is to say that they help to condition and change investors' expectations about the revenues and returns that new investment might generate.

This is very different from saying that high prices and consequent supernormal profits part-pay for new investment. For one thing, it may be that the firm that responds first to high prices is a brand new entrant. In this case, it should be clear that the new entrant obtains no pre-funding from high market prices; it gets revenues only when it has built its assets and it is able to sell services to customers. In the event that it is an incumbent that brings forward new investment, one has to look at revenues and costs at the margin, i.e.:

- with or without investment, the incumbent will still benefit in the short term from high prices and high returns until such time as someone – possibly the firm in question, possibly a rival – injects new capacity into the market;

⁴ CAA (2014), Economic regulation of new runway capacity – a draft policy.



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- at the margin, choosing to invest requires the firm to take on an amount of new cost; and
- at the margin, the additional revenues will be (only) the revenues that the new investment generates when it is providing services to customers; hence
- it has to be that the decision on whether or not to invest depends on whether the incremental revenues exceed the incremental costs.

It cannot be that the high profits that are apparent prior to capacity expansion come into this calculation. These profits are 'sunk' in nature and accrue to investors with or without new investment. If a firm were to treat the revenue as pre-funding or part-payment, they could well end up costing investors money by adding cost to the balance sheet and to the P&L that will not be matched by additional income.

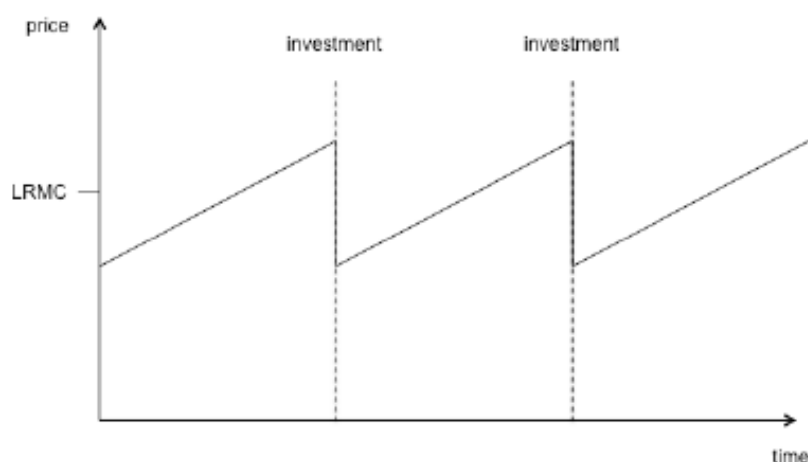
2.2.2 Price reductions

The CAA's analysis of price profiles in competitive markets has tended recently to extend only as far as the end of the construction phase of new infrastructure works. This means that the story is incomplete. If parallels to other markets are helpful, as part of the process of designing a RAB-based price cap, the CAA should go on to consider what happens when new capacity enters service.

We remarked earlier that prices can be expected to fall. The scale of the price reduction depends on the scale of the new capacity and the extent to which the market switches from a position of under-supply to a position of over-supply.

In an airport setting, new investment tends to be lumpy, meaning that there can be spare capacity for a period of several years after the completion of new projects. The competitive market thought experiment is therefore one in which suppliers compete for customers and prices fall quite markedly (all other things remaining constant), possibly to the extent that investors have to endure a period of sub-normal returns.

Figure 1: Price profiles in competitive markets with lumpy investments



If part of what gets the CAA comfortable about pre-funding is the knowledge that prices in other markets rise when capacity gets tight, logically, the CAA should also then be concerned that prices also fall by a sufficient amount after investments are made. This may happen organically, especially if there is competition among airports to fill spare capacity in



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the market. But otherwise, there may be an argument that a decision to pre-fund should be paired with subsequent charge reductions, such that within the framework of RAB-based pricing that the CAA operates prices go below the RAB-based price in the first few years of operation.



3. Purpose of Pre-funding Airport Capacity

Having identified that pre-funding is not typically a feature of competitive markets, it is interesting to consider why it is that there can be proposals for pre-funding of airport investments and, in particular, what pre-funding does to a project's economics.

We set out our take on this matter below. In doing so, we try to highlight the importance of distinguishing between:

- additional revenues – i.e. permitting an airport to collect additional charges during the construction phase of a project, to supplement the revenues that the airport is able to collect when assets are in operation; and
- advancement of revenues – i.e. the bringing forward of revenues that an airport would otherwise collect from users only after new assets open.

We also suggest that the character that pre-funding takes will necessarily vary from case to case depending, crucially, on the scale of an airport's market power.

To fix ideas, we consider two very stylised airports: one that is not expected to have significant market power (SMP) after new capacity opens; and one that is expected to retain SMP over a very long time horizon. (Note: an airport has SMP if it can profitably act independently of other airports and raise its charges above the market price.)

3.1 Pre-funding = additional revenues

An airport that does not have SMP is, by definition, a price taker. When taking on capacity expansion, such an airport is betting that the market price will come out at a sufficient level over the life of the built assets to justify the capital that it is committing to the project. That is to say that the airport has to expect to be able to charge enough users a high enough price to cover the costs of operating its new facilities, plus the payback of the original investment, plus a return for its investors.

Over very long horizons, there will naturally be uncertainties about both price and volumes. Investors may react to this uncertainty by marking up their cost of capital and demanding higher returns to compensate them for the risk that revenues will not materialise as envisaged, thus causing them to make a loss on their investment. This makes pre-funding an attractive idea. If an airport can get users to pay for some of the investment before new capacity opens and before the airport becomes a price taker, it reduces break-even charges and volumes to a more attainable level, which may in turn make investors less likely to worry about stranding risk and more willing to make finance available at a lower cost of capital.

The arithmetic in pre-funding can be drawn out in the following simple illustrative worked examples. We depict an initial investment of £10 billion, to be paid back over 40 years. We assume that the cost of capital is 7%. Without pre-funding, users will need to pay the airport and the airport will need to pay investors an average⁵ of £925m a year. This means that the airport must recoup approximately £37 billion from charges over a 40-year period.⁵

⁵ To keep things simple, we use a flat pay-back profile in all of our worked examples, where the pay-back amounts sum in NPV terms to offset the costs incurred by the airport. In practice an airport may seek to backload cost recovery to better match the profile of capacity utilisation.

⁶ The airport will also have to recover revenues to cover operating costs for new capacity and to cover the costs of existing facilities.



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Table 2: Expenditure, pay-back and financing costs, no pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-140	-290	-450	-622	-805						-2,100
Pay-back						925	925	925	...	925	36,900
											NPV @ 7% = 10,000

Source: First Economics' calculations.

If, however, the airport is able to recover monies from users before the new runway opens, the total to be paid back over the subsequent 40 years reduces via two effects:

- first, by reducing net outstanding capital at the point when new capacity comes on stream, the airport needs subsequently to recover less money over the 40-year life of the assets; and
- second, if investors see this as a more manageable proposition, they will respond by marking down financing costs from the level they would charge without pre-funding.

Let us assume, for illustration, that the airport is given pre-funding to cover its financing costs. Let us also assume that investors do indeed perceive lower risk as a result of this pre-funding and that the cost of capital falls to 6%. With these two effects, the total amount to be recovered through airport charges falls over the period to just over £28 billion. This implies that the total cost of the project is markedly lower than would be the case without pre-funding.

Table 3: Expenditure, pay-back and financing costs, with pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-120	-240	-360	-480	-600						-1,800
Pay-back	120	240	360	480	600	665	665	665	...	665	28,400
											NPV @ 6% = 10,000

Source: First Economics' calculations.

At first sight, it might seem that this creates a compelling case for pre-funding. However, the arithmetic that we set out in these worked examples looks first and foremost at the perspective that the airport and its investors will have. Users will have a different take – i.e. they will want to know what all this means for actual, out-turn airport charges – and here it is important to remember that we have deliberately set our stylised airport up to be a price taker once new capacity opens.

This is relevant because the £37 billion and the £28 billion do not translate directly into the total amount of charges that the airport would levy on users. An airport that does not have SMP does not and cannot set its price independently of its competitors, but will instead take the market price. This means that total airport charges will be higher or lower than the figures we have quoted, and by an unknowable amount, depending on the level that the market price settles at. This is a hugely important observation because it means that the costs borne by users will be the same in our two scenarios except to the extent that users are asked to contribute pre-funding.



This may be seen in the following re-worked examples. In contrast to tables 2 and 3, in these examples we focus on the revenues that the airport charges rather than the costs it needs to recover. Because we don't know what the market price will be, we depict three possible out-turns comprising high revenues, medium revenues and low revenues.

Table 4: High out-turn revenue scenario

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						
Charge revenue without pre-funding						1,000	1,000	1,000	1,000	1,000	40,000
Charge revenue with pre-funding	120	240	360	480	600	1,000	1,000	1,000	1,000	1,000	41,800

Source: First Economics' calculations.

Table 5: Medium out-turn revenue scenario

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						
Charge revenue without pre-funding						750	750	750	...	750	30,000
Charge revenue with pre-funding	120	240	360	480	600	750	750	750	...	750	31,800

Source: First Economics' calculations.

Table 6: Low out-turn revenue scenario

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						
Charge revenue without pre-funding						500	500	500	...	500	20,000
Charge revenue with pre-funding	120	240	360	480	600	500	500	500	...	500	21,800

Source: First Economics' calculations.

It is straight-forward to see that in all of the out-turn scenarios, the total charges paid by users differs by £1.8 billion depending on whether or not they are required to pre-fund.

Seen in this way, we can say that pre-funding at an airport that does not have SMP can best be described as additional funding, or a form of subvention, or some sort of exceptional user contribution. It could even be said that pre-funding exhibits a lot of similarity to a capital grant, in that the airport would, in effect, be receiving a one-off 'gift' without any expectation of repayment.



3.2 Pre-funding = advancement of revenues

At the opposite end of the spectrum sits an airport that is expected to have SMP over a very long horizon. Pre-funding arrangements at airports with this character tend to take the form of advancement of revenues, in which higher charges in the short term from pre-funding airport charges will be offset by lower charges in the medium to longer term, either voluntarily or through direct intervention by the CAA.⁷ (An airport with SMP is not a price taker and will not generally be permitted to set charges at a level of its choosing, but will instead face some sort of price cap.)

The fact that the airport has SMP raises different issues, however. In particular, it is not altogether clear that pre-funding affects the cost of capital and total scheme costs in a material and favourable way.

To see this, it is important to remember that an airport with SMP can price independently. An airport with enduring SMP that is contemplating an expansion of capacity is therefore likely to be much less concerned about future market prices. It may also worry much less about future volumes because it knows that if out-turn volumes come out lower than forecast it will likely have the ability, within limits, to increase prices to offset any loss of forecast revenue.

It follows that investors at such an airport do not carry nearly as much volume risk, revenue risk or stranding risk as investors at an airport that does not enjoy SMP. This is likely to be reflected from the outset in a lower cost of capital and lower project financing costs. And crucially, for the purposes of the subject matter in this paper, it means that pre-funding is not going to materially change investor perceptions of risk (since the risks that pre-funding can help reduce or eliminate do not exist in the first place).

This may be seen more clearly in the following worked examples. As previously, we provide for a £10 billion investment to be paid back over 40 years. We set financing costs from the outset at 6% per annum, in line with the lower figure in the worked examples in section 3.1. The total cost to be recovered from users is around £32 billion.

Table 7: Expenditure, pay-back and financing costs, no pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-120	-247	-382	-525	-676						-1,950
Pay-back						795	795	795	...	795	31,800
											NPV @ 6% = 10,000

Source: First Economics' calculations.

We next provide for pre-funding of financing costs. As before, this reduces required annual pay-back amounts. But, crucially, the cost of capital in this worked example remains at 6%.

⁷ As an illustration, the pre-funding that the CAA allowed Heathrow Airport for the construction of Terminal 5 took the form of an NPV-neutral advancement of revenues from Q5 (2008-13) to Q4 (2003-08).



Table 8: Expenditure, pay-back and financing costs, with pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-120	-240	-360	-480	-600						-1,800
Pay-back	120	240	360	480	600	665	665	665	...	665	28,400
											NPV @ 6% = 10,000

Source: First Economics' calculations.

The total cost to be recovered from users in order for the airport to break even is just over £28 billion, inclusive of pre-funding, giving a slightly lower net total. However, this is no more than a timing issue. Pre-funding forces users to pay earlier, so reducing requirements for investor capital and project financing costs in £m. But in present value terms, using the airport's cost of capital⁸ of 6%, total cashflows sum in the end a round £10 billion with or without pre-funding.

If pre-funding does not reduce the project cost of capital and is made NPV-neutral in its effect, the obvious first question to ask is: will users benefit from paying early and swapping higher charges today for lower charges later? This is not usually thought to be the case – if it were, the CAA, and other economic regulators, should really be setting price controls that entail very rapid payback of all capital investments, rather than providing for depreciation over the economic life of the built assets.

The main argument that we can conceive of for revenue advancement instead relates to the way in which pre-funding reduces the amount of debt and equity finance that an airport requires. In our worked example, the £1.8 billion that the airport collects from users during construction is £1.8 billion that the airport does not need to obtain from the financial markets. Set against the scheme capital cost of £10 billion, this is a substantial sum of money and an airport owner may judge such a large reduction in its external financing requirement to be quite attractive, especially if the financing requirement is weighted more towards new equity and less towards additional debt.

3.3 Summary

This admittedly very stylised analysis brings out two key points which we think should factor directly in to any deliberations in this area:

- first, allowing pre-funding at an airport that is not expected to have SMP and which is likely to be a price taker after capacity expansion ought to be equated to additional funding, because there can be no expectation that pre-funding will be recognised via lower airport charges once capacity opens; and
- second, revenue advancement at an airport that has enduring SMP will have a very limited impact on investors' perceptions of riskiness and cost of capital because fears about stranding are unlikely to rank high up in investors' concerns. The value of pre-funding lies instead in the pound-for-pound reduction in equity and debt requirements and in alleviating the financing challenge that an airport's owner would otherwise have.

We make these observations in the hope that they will contribute to a more informed debate about the purpose of pre-funding.

⁸ By using the airport's cost of capital, we are focusing on present value as viewed from the firm's perspective. In section 4, we consider the possibility that present values might look different from a user's perspective.



4. Cost-benefit Analysis

Having obtained an understanding of what it is that pre-funding might do to a project's economics, we now list out the full set of considerations that we would expect to factor into any assessment of the pros and cons of pre-funding of new airport capacity.

In doing so, we should be clear upfront that it is not our intention to detail the costs and benefits of pre-funding for any of the specific proposals that are currently being considered in the UK by the Airports Commission or elsewhere. Our ambitions at this stage of the process extend no further than identifying the main inputs into a 'cost-benefit analysis' and sketching out the work that we would expect a decision-maker to want to undertake to put hard numbers to each component part in the calculations.

4.1 Categories of benefits and costs

We deliberately look at benefits and costs from the perspective of airport users, where benefits are the advantages that users enjoy and costs are the disadvantages that users suffer as a consequence of paying in advance for new airport facilities.

4.1.1 Benefits

Pre-funding and the cost of capital

We showed in section 3 with our stylised airport that is not expected to have SMP in the long term that pre-funding can, in certain circumstances, reduce a scheme's cost, in particular by making a project more attractive to investors and so reducing project financing costs / cost of capital.

This is primarily of benefit to the airport. The effect could, in theory, also be of direct benefit to users if lower scheme costs translate eventually into lower charges over the life of the built assets. In light of the preceding discussion, however, it is not entirely clear how to us this would happen. There would therefore need to be a clear understanding of the 'transmission mechanism' in order to count lower cost of capital as a user benefit.

Pre-funding and financing requirements

One of the concerns that the Airports Commission has identified in its work relates to the scale of the debt and equity finance that scheme promoters need in order to build new runways and make linked investments in new facilities. Specifically, it is possible that the amounts involved will be too large for the capital markets to swallow during the relatively short periods of time over which expenditures will be incurred.

As we noted in section 3, pre-funding may be helpful in these circumstances insofar as every pound that is collected from existing users serves to reduce the amount of finance that an airport needs to obtain from investors. This in turn reduces the risk that projects might have to be down-sized, slowed down or postponed in the face of capital market capacity constraints.

Private and social benefits

Any benefits from the two preceding factors (i.e. a lower cost of capital and alleviation of capital market capacity constraints) will be magnified considerably if they mean that schemes go ahead which would otherwise be commercially unviable. In extremis, it could be that pre-funding is the key to unlocking investment and:

- the private economic benefits that users will take from additional flights;



- spillover economic benefits for the UK economy as a whole from greater connectivity; albeit offset by
- social and environmental disbenefits for local communities.⁹

In this regard, we note that the Airports Commission's work indicates that all three schemes that are currently under consideration in the UK show high, positive net benefits, which would be lost if none of the proposals can practicably be taken forward.

4.1.2 Costs

Additional revenues vs advancement of revenues

We explained in section 3 that pre-funding can mean either the payment by users of additional charges or a NPV-neutral reprofiling of charges over time. In the first of these cases, pre-funding imposes an easily quantifiable, direct net cost on users – i.e. the amount of additional monies that users pay during the construction phase of a project.

Intergenerational effects

Where the intention is that pre-funding is an advancement of future revenues, rather than a new imposition on users, it is still possible to envisage detriments as follows:

- some of today's users may not use or be very infrequent users of London airports in the future. Such individuals may conceivably never obtain any benefit from the contribution that they make to the cost of expanding UK airport capacity; and
- other users may place a high value on money they spend today and attach a low value to benefits or savings that might accrue to them in the future.

Where any of the above applies, pre-funding is not NPV neutral, either from the perspective of individual users or from the perspective of the customer base as a whole – i.e. there is a net cost to users that must be taken into account by policymakers.

To illustrate this, we can use one of the examples from section 3. In the table below, we reproduce the revenue advancement worked example from tables 7 and 8.

Table 9: Expenditure, pay-back and financing costs, no pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-120	-240	-360	-480	-600						-1,800
Pay-back						795	795	795	...	795	31,800
NPV @ 6% = 10,000											

Source: First Economics' calculations.

⁹ We note that the second and the third of these things may be less directly relevant to a regulator whose primary duty is to further the interests of users, as compared to a decision-maker that is looking at costs and benefits from a broader societal perspective.



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Table 10: Expenditure, pay-back and financing costs, with pre-funding

Year	-5	-4	-3	-2	-1	1	2	3	...	40	Total
Cost	-2,000	-2,000	-2,000	-2,000	-2,000						-10,000
Financing costs	-120	-240	-360	-480	-600						-1,800
Pay-back	120	240	360	480	600	665	665	665	...	665	28,400
											NPV @ 6% = 10,000

Source: First Economics' calculations.

We explained that at the airport's cost of capital of 6%, the cost to users is identical in NPV terms with or without revenue advancement. If, however, a user's discount rate is slightly higher at, say, 7%, total charges from the user's perspective have a higher NPV when revenues are advanced and users are asked to pay earlier. Conversely, if a user's discount rate is slightly lower at, say, 5%, the opposite is true and the cost to the user has a lower NPV when there is pre-funding.

Table 11: Difference between NPVs of total charges with and without pre-funding

User discount rate	Impact of pre-funding on users (NPV)
5%	- £180m
6%	-
7%	+ £235m

Source: First Economics' calculations.

This shows the importance of understanding where user discount rates sit in comparison to an airport's cost of capital. Where users have relatively high discount rates – i.e. where users have a comparatively strong preference for paying later – pre-funding will be detrimental (and vice versa if users have relatively low discount rates).

Pre-funding, costs to users and distortions to demand

The costs involved in pre-funding in any case extend beyond the direct financial bill in £m. Charges at airports like Heathrow and Gatwick airports are currently cost-reflective – i.e. the charges that users pay are set to match the costs of the resources that the airport uses when providing services. Pre-funding breaks the link between charges and costs, in that part of the charge that users pay cannot be attributed directly to current service costs but instead relate to the costs of facilities that are not yet open for business.

Non-cost-reflective prices are normally considered detrimental to overall economic efficiency. In particular, if high, non-cost-reflective charges deter some users from making use of facilities which they would otherwise happily pay a cost-reflective price for, those users and society as a whole are worse off (NB: the economic term for this effect is 'deadweight loss'). In the case of airports, such distortions may manifest themselves in the form of under-utilisation of capacity by airlines or under-utilisation of capacity by users (e.g. lower load factors).

Weaker incentives

An airport that is permitted to collect revenues for yet-to-be-opened facilities may become more relaxed about project timetable and completion dates. This is especially the case under the 'assets in the course of construction' (AICC) funding arrangement that the CAA has



historically used with the UK's regulated airports. This is because the AICC approach is designed to match financing costs pound-for-pound with revenues from users, meaning that an airport does not directly bear the additional interest costs that would otherwise arise out of project delays.

By comparison, an airport that is paid according to use has very strong incentives to meet deadlines and give new facilities to users as early as it possibly can. Such an airport does not have automatic cover for its financing costs, and so every month of delay means that the airport incurs another month of financing costs that it has to pay out of its own pocket.

Insofar as users are better off when they are able to use the facilities that they are paying for, it can be seen that pre-funding risks misaligning incentives and diluting the benefits that new capacity is intended to bring.

4.1.3 Other

Pre-funding and competition

One of the features of pre-funding is that it can alter relative prices across airports. Where there is competition between airline services at different airports, this may cause users to switch their demand to rival airports and/or to rival airlines. The economic efficiency/inefficiency of such switching would require consideration.

4.2 Counterfactual

A decision-maker that is asked to consider pre-funding of airport investment will need to quantify the factors that we have identified. This will mean, among other things:

- quantifying the risk of project delay and postponement of user benefits;
- quantifying any potential reduction that pre-funding might contribute to a project's cost of capital and overall scheme viability;
- establishing where there are capital market constraints, and if pre-funding helps to alleviate those constraints; then
- quantifying the net additional financial cost that pre-funding will impose on users; and
- quantifying the wider economic distortions that pre-funding can cause.

In carrying out this analysis, it is important that there is an appropriate counterfactual. The cost-benefit analysis is not as simple as establishing what would happen with and without pre-funding; it is also necessary to consider other superior and less costly means of addressing the problems that pre-funding is intended to solve.

We expand on this point below.

Consideration of other sources of funding

Airport users are not the only conceivable source of funding for airport investments. Other possible candidates include central government, local government and local businesses.

All of these stand to gain from expansion in capacity, as has been highlighted clearly in the Airports Commission's work on wider economic benefits. There is also obvious precedent for funding infrastructure investment from such sources. For example, we identify in our survey of infrastructure funding in other sectors that:

- Crossrail has received advanced funding from a very wide range of sources, including central government, the Greater London Authority, a business rate supplement and



direct contributions from organisations like Heathrow Airport, the City of London Corporation and Canary Wharf Group; and

- gas network extensions in Northern Ireland have been part-funded by subvention from the Northern Ireland government.

There is particularly strong logic for looking towards such sources in situations where there are fears that a project might not otherwise be commercially viable without pre-funding. Such doubts are effectively akin to saying that users may not necessarily volunteer to pay in full for new investment, in which case it is perhaps somewhat counter-intuitive to think that a good policy response is to require users to pay at another time via another means. If there is good reason to take forward a project that would not otherwise be supported by private investors, it is likely that those good reasons relate to the spillover benefits that investment will bring to the wider economy and to the society as a whole. It therefore makes sense that policymakers should consider whether some of the costs should go more directly to those that stand to benefit.

Consideration of other sources of finance

The proposition that pre-funding is required to alleviate capital market constraints is one that we think needs to be tested very carefully. Before making any conclusions on this matter, a thorough analysis of market capacity would need to be undertaken, covering all available sources of capital, including:

- debt – bank loans, bond finance, in various structures, with a mix of maturities and in a mix of currencies; and
- equity – share capital from a wide potential range of investors in the UK and overseas.

It is very important in this analysis not to take the current ownership structure at an airport as a given. The objective is not to determine whether the existing shareholders are capable of raising the necessary finance, but rather to ascertain whether there is a sufficient pool of capital to finance the construction of the new runway and associated facilities. Insofar as this requires a degree of flexibility about the balance between debt and equity financing, it may be that there has to be a certain amount of disturbance to existing ownership arrangements.

Consideration should also be given to ways in which government support, or other interventions, could potentially widen the pool of available capital. In other sectors – e.g. rail – we have observed the government underwrite borrowing for infrastructure investment. This is beneficial as much from a capacity perspective as from a cost perspective because it opens the door to a class of investors that will only take very safe AAA or AA rated debt. Adding these investors to the set of investors who are content to lend on commercial terms will almost certainly mean that airport investments can be financed without a requirement for pre-funding.

Consideration of regulatory innovations

There may be steps that an economic regulator can take to improve investor confidence in the commercial viability of airport investments. For example, if investors perceive risks around the form and detail of future price regulation, and if these perceptions serve to push up the cost of capital, a regulator may be able to address investors concerns via regulatory policy statements (of the type that the CAA publishes).

Likewise, it may also be possible to address some of the costs of user pre-funding via regulatory intervention. For example, if one of the possible downsides of pre-funding is the weakening of incentives to deliver capacity on time, it ought to be possible to address this risk by modifying the regulatory framework to tie AICC funding to the delivery of project milestones. If set up appropriately, it should be possible for a regulator to preserve the



financing cost penalty that normal commercial businesses suffer if they cannot meet deadlines.¹⁰

4.3 Summary

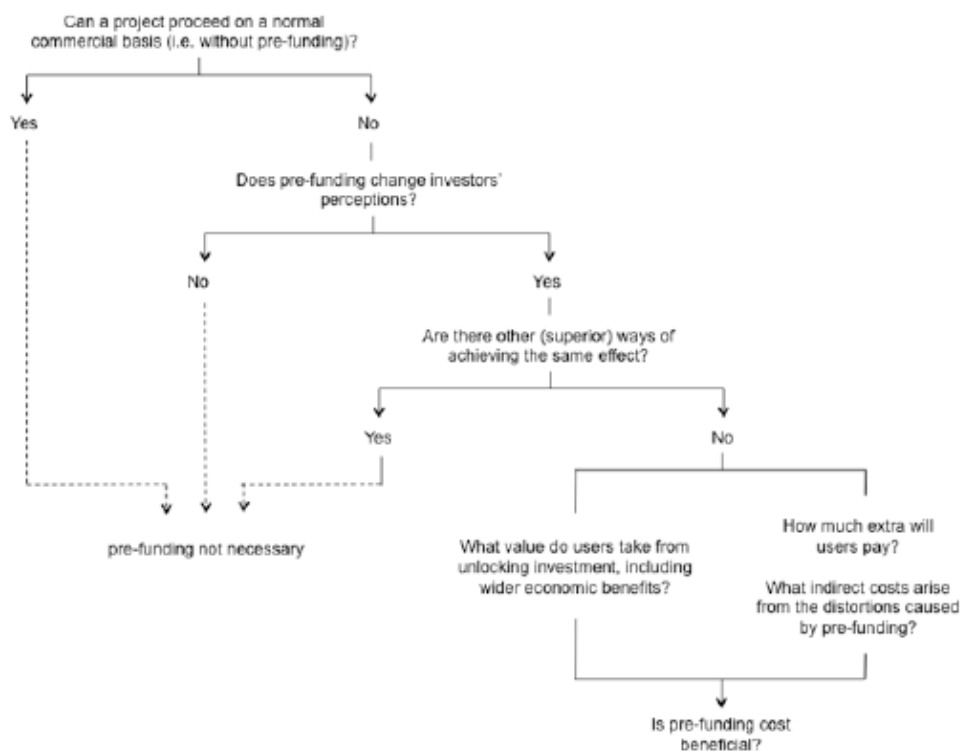
The factors identified in the preceding sub-sections may, on first read, feel like quite a long and disparate list of considerations. We think we can bring the preceding discussion together into a step-by-step overview of the analysis that a decision-maker will need to carry out when contemplating the pre-funding of airport investments. The steps are:

- step one – consider whether an investment can take place without pre-funding, as is the case in normal competitive markets;
- step two – if there is a problem, determine whether pre-funding changes the proposition that is put to investors;
- step three – establish that there are no other available means of achieving the same effect;
- step four – quantify the benefits of improved investor perceptions, in the form of:
 - lower lifetime user charges; and/or
 - the unlocking of investment and associated wider economic benefits (if the change in perceptions is so marked as to make an otherwise unviable scheme viable);
- step five – quantify the gross additional financial cost that users pay as a result of pre-funding (i.e. in the form of higher airport charges) in order to obtain these benefits;
- step six – add in the second-order costs and benefits relating to distortions to demand, distortions to incentives, etc.; and
- step seven – compare benefits to costs.

The process is laid out graphically in figure 2.

¹⁰ We note that the use of capital triggers at both Heathrow and Gatwick means that the current CAA regulatory framework already includes some of these features.

Figure 2: Cost-benefit assessment





Appendix

Survey of funding profiles in infrastructure industries

In this appendix we give a survey of how large infrastructure investments have been funded in other sectors. We do this by looking in turn at:

- stand-alone, discrete, investments in regulated sectors;
- unregulated UK infrastructure; and
- infrastructure investment in competitive markets.

A1. Stand-alone, discrete, large-scale investments in regulated sectors

Regulators in a number of sectors have developed bespoke arrangements to handle discrete large-scale investments. In this section we consider the funding of investments related to:

- GB offshore electricity transmission networks;
- GB onshore electricity transmission projects;
- the Thames Tideway Tunnel;
- Northern Ireland gas networks;
- Heathrow Terminal 5; and
- the second terminal at Dublin Airport

In each case we, first of all, provide a high level overview of the project and describe the cost and build duration before outlining the funding arrangements.

A1.1 GB offshore electricity transmission (OFTO)

Overview

The government has set ambitious targets for the deployment of renewable energy. An important aspect of this is the adoption of wind generation. To facilitate the expansion of offshore wind technology, the government has introduced a new regulatory regime for offshore electricity transmission which effectively separates the offshore generation (i.e. the windfarms) from the offshore transmission (i.e. the cables and infrastructure which bring the power onshore). The regime is designed to ensure that offshore renewable generation projects are economically and efficiently connected to Britain's electricity grid.

A key part of the regime is the granting of offshore transmission licences on the basis of a competitive tender process. Ofgem is responsible for running these competitions. The licences give an entitlement to revenues over the life of the assets subject to a range of obligations on the offshore transmission operator (OFTO), e.g. to ensure compliance with industry standards.

Cost and duration of build

The OFTO regime began in 2009 and is projected to develop as an enduring regime with a significant pipeline of projects expected to be tendered over the coming years. At the time of drafting, competitive tenders have been run (or are ongoing) for fourteen OFTOs with a total transfer value of £2.9bn, ranging from the smallest project of £33m to the largest so far of £459m.

Funding arrangements

Ofgem sets the OFTO's allowed revenue for a 20-year period. The OFTO's 20 year revenue stream reflects the costs of building, operating and maintaining the assets, including financing costs. The revenue stream is linked to RPI inflation and, unlike other energy



networks regulated by Ofgem, there are no periodic resets of the price control and therefore there is no revenue at risk due to regulatory re-setting of prices.

OFTO's only begin to receive revenue when the assets are operational, which means there is no pre-funding of the investment.¹¹

The cost of these arrangements is ultimately paid for by electricity consumers through their power bills. This is funnelled through the National Electricity Transmission System Operator.

The £2 billion plus of capital committed to OFTO projects to date has come from a variety of sources including:

- equity investors, including infrastructure funds and strategic investors from Europe and Australia;
- the European Investment Bank (EIB), which has committed over £1bn to the OFTO assets; and
- a wide range of commercial banks including Barclays, ING, Lloyds, BNP Paribas, Santander, National Australia Bank.

A1.2 Onshore transmission projects

Overview

Onshore transmission is regulated under Ofgem's RIIO framework for energy network regulation. As part of these arrangements Ofgem has developed a Strategic Wider Works (SWW) uncertainty mechanism. Under the SWW framework, a transmission owner (TO) is able to request an adjustment to its revenue allowances during the price control period for building infrastructure projects of wider system significance which were not sufficiently mature when setting the price control.

As an example of this process, we have looked at the treatment of the Caithness Moray transmission project. Scottish and Southern Energy (SSE) owns and operates the electricity transmission network in the north of Scotland. SSE has identified that a major reinforcement of this transmission network is needed to enable proposed wind, wave and tidal generation sites to connect. This will involve the installation of a subsea cable between Caithness and Moray, with a number of associated upgrades to the onshore transmission network.

Cost and duration of build

Ofgem has allowed SSE £1.1bn for the project, a reduction from the company's projection of £1.2bn and works are expected to be completed by 2018.

Funding arrangements

In its decision on the assessment of the project¹², Ofgem explained that it would allow SSE to recover revenue associated with the project from 2015/16 despite the fact that the project is not expected to be completed until 2018. In reaching this view, Ofgem noted that:

The Caithness Moray project is exceptional, in terms of its absolute scale and also relative to SHE Transmission's current regulatory asset value. If revenues were not adjusted for the project, SHE Transmission would face a shortfall of nearly 25%

¹¹ See, for example, paragraph 3.16 of Ofgem publication <https://www.ofgem.gov.uk/ofgem-publications/91925/oftobuildpolicyupdatemasterhcproofread09122014.pdf>

¹² https://www.ofgem.gov.uk/sites/default/files/docs/2014/12/decision_on_our_assessment_of_the_caithness_moray_transmission_project_0.pdf



compared to what it might otherwise have expected. We think there could be greater benefits for consumers from allowing the company's revenues to follow cash flows. This is because the cash flow risk and financing costs could be greater than the benefit in terms of improving predictability.

We acknowledge that the change might cause some customers, particularly large users to bear an increase in charges. National Grid has estimated that the annual increase for the average half hourly user next year would be £220 (a 4% increase to annual charges). It would also increase the transmission component of the annual electricity bill of a typical domestic customer by £1. However, holding over the revenue update until November 2015 will cause greater volatility in transmission charges than is necessary in 2016/17, which is similarly undesirable. Also, it is likely that some suppliers are already planning on the change (following our October consultation), so a reversal now would also cause a problem with predicting charges next year.

A1.3 Thames Tideway Tunnel

Overview

The Thames Tideway scheme is a proposed 25 km (16 mi) tunnel running mostly under the River Thames through central London, intended to provide storage and conveyance of combined raw sewage and rainwater discharges that currently overflow into the river Thames. It is the biggest scheme delivered by a sewerage company since privatisation.

Given the size and scale of the project and the associated financing requirements it will be delivered by an independent and separately licensed Infrastructure Provider (IP). The IP will be established following a competitively procured process designed to provide customers with value for money through the exposure of the cost of capital to a competitive bidding process.

The IP will be required to finance, design, construct, own and maintain a large portion of the project¹³ and, in return, will receive a regulated revenue stream for the project allowed by Ofwat and collected from customers.

Cost and duration of build

The estimated cost, excluding financing costs and maintenance costs, is £4.2 billion in 2011 prices. Planning was granted in 2014 and works are expected to be completed in 2023.

Thames Water's draft business plan for 2015-2020 shows average household bills rising by £40, before inflation, over the period to pay for the tunnel. The cost of the project could add a maximum of £70 to £80, before inflation, to average bills by the early 2020s compared to 2011.

Funding arrangements

It is currently anticipated that the IP will charge Thames Water for its services under a Revenue Agreement, and Thames Water will, in turn, recover such charges from its wastewater customers.

It is anticipated that the IP licence (and the commencement of revenues) will be issued in 2015.

In issuing draft guidance on the approach to the economic regulation of the arrangements,¹⁴ Ofwat said that the IP will be entitled to receive revenues to finance future capital investment

¹³ Thames Water will continue to be responsible for some of the works associated with the scheme.

¹⁴ http://www.ofwat.gov.uk/future/accountability/thames/pap_tec20141007draftguidance.pdf



requirements during the construction phase, subject to true-up adjustments for actual expenditure incurred. Ofwat's explanation was as follows:

Ofwat considers that this approach should enable the IP to raise debt and equity in the construction phase on terms as close as possible to those, taking into account the nature of the Project and the package of financial support provided by the UK Government, applicable to a normally operating wholesale wastewater undertaker provided that it is operated efficiently and in compliance with the obligations placed on it under its licence. Ofwat considers that the balance between the timing and quantum of customer payments is in customers' overall interest.

Because of the nature of the risks inherent in executing a project of this nature, the Government has agreed in principle to provide contingent financial support under a Government Support Package (GSP). This support will help to facilitate the financing of the project in the private sector and keep costs down for customers.

A1.4 Northern Ireland Gas Networks

Overview

Piped gas arrived in Northern Ireland only in the 1990s following the construction of a transmission pipeline with Scotland. Networks have been rolled out progressively, beginning with Greater Belfast and Lame starting in 1996 and the 'ten towns' area starting in 2005.

The latest proposal involves extending the gas network to the west of the country. The Northern Ireland Authority for Utility Regulation (the Utility Regulator), is responsible for the grant of the necessary licences and held a competition for the award of these licences during 2014. The winning bidders were Mutual Energy and Scotia Gas Networks.

Cost and duration of build

DETI's economic appraisal of the project published in September 2012 estimated the total cost at some £200m.

Funding arrangements

In January 2013 the Northern Ireland Executive agreed to provide a subvention of up to £32.5m to support the construction of the new high-pressure network. The remainder of the capital costs will be financed by the new licensees, who will eventually recover their expenditures via charges levied on newly connected industrial and domestic customers.

A1.5 Heathrow Terminal 5

Overview

London Heathrow Terminal 5 is an airport terminal at London Heathrow Airport, serving the UK capital city of London. The main building in the complex is the largest free-standing structure in the United Kingdom. Terminal 5 is currently used exclusively as one of the three global hubs of International Airlines Group, served by British Airways and Iberia. The terminal is designed to ultimately handle 35 million passengers a year.

Cost and duration of build

Following a lengthy public inquiry, construction of the new terminal began in 2001 with the first phase opening in 2008 and a second phase in 2011. In total T5 cost £4.6m (in 2008 prices) to deliver.



Funding arrangements

Given that Heathrow Airport is subject to detailed economic regulation by the CAA, the regulatory regime (then under the Airport Act 1986) was central to the funding of the new terminal. In light of the scale of the project (relative to the RAB) a number of bespoke regulatory measures were introduced to facilitate its development.

An advancement of revenues from Q5 into Q4 was permitted through a RAB adjustment worth approximately £0.5bn (07/08 prices). In its final decision¹⁵ on the Q4 (2003 – 2008) price review, the CAA noted that BAA had argued that it would not be able or willing to finance its investment programme in the absence of revenue advancement. The Competition Commission had placed weight on this argument in advocating the revenue advancement. The CAA agreed with the Competition Commission that financing considerations together with improving regulatory commitment provided a strong rationale for revenue advancement.

The CAA also noted that a tighter price cap resulting from reduced revenue advancement would be more likely than not to cause BAA to slow or reduce its investment programme with likely adverse effects on users. The CAA considered that this would be inconsistent with its statutory objectives given the expected unsatisfied demand at Heathrow.

Finally, the CAA considered that not proceeding with revenue advancement would result in a substantial lessening of the RPI+6.5% price cap at Heathrow, pointing instead to substantial real price reductions in Q4 to be followed in Q5 with a much larger real increase. The CAA considered that this profile would be contrary to achievement of its statutory objectives, by providing for an inefficient profile of pricing, by diluting BAA's investment incentives (since large price increases in 2008/9 would have a low probability of being seen as credible or deliverable), and by making the delivery of BAA's investment programme more difficult. The CAA concluded that not allowing revenue advancement for this review would increase the likelihood that a much larger revenue advancement or higher cost of capital would have to be adopted, now or in future, to compensate.

This revenue advancement was in addition to the CAA policy of permitting a return on assets in the course of construction.

To strengthen the incentives on BAA to complete work on time, capex triggers on its revenues were introduced which would have the effect of reducing allowed revenues by the amount of return the airport would have received had the project/trigger not been delivered on time.

Therefore, the construction of Terminal 5 included a portion of pre-funding by airport users through the revenue advancement and the return on AICC from 2003 until the terminal opened in 2008.

A1.6 Commission for Aviation Regulation – Dublin Airport

Overview

Dublin Airport is the largest airport in Ireland. It is regulated by the Commission for Aviation Regulation (CAR) along broadly similar lines as regulated airports in the UK, including via a RAB-based price cap.

In October 2006, Dublin Airport received planning permission to build a new multi-million-euro terminal capable of handling 15 million passengers a year. In developing its plan for a second terminal at Dublin Airport, the DAA's objectives were to create a new hub for

¹⁵ <http://www.caa.co.uk/docs/5/erqdocs/baadecision200308.pdf>



transatlantic flights and increase footfall and revenue by encouraging other major carriers to re-route their services through Ireland.

Funding profile

In an interim review of airport charges carried out in 2007, the Commission considered that there were circumstances where it would be appropriate to modify the regulatory arrangements to accommodate the development of large scale projects such as T2. In particular, CAR introduced the principle of trigger pricing under which “milestone” events must be passed before the cap on charges is revised to include an allowance for the costs of building the new facilities. In developing this approach, the Commission noted that:

The principle of triggers appears to be particularly relevant for large-scale projects, such as T2. Such projects imply a significant increase in the RAB. This could materially affect the level of the cap on charges that the Commission determines. To adjust the cap without any requirement on the regulated entity to develop the facility for which the funding was sought risks undermining the incentive properties of price-cap regulation. A higher price cap without any restrictions attached would allow the regulated entity to collect higher revenues and potentially invest in other, smaller capital projects without having to have regard to managing the costs carefully, rather than investing in the large-scale project which was the justification given for the higher price cap. “Triggers” or “milestones” are one way of avoiding this scenario. In other words, a trigger mechanism is a method whereby the airport operator is enabled to develop and operate the airport in a financially viable and sustainable manner that meets the needs and requirements of users for additional infrastructure whilst protecting those users’ interests.

The Commission also noted that:

Triggers have the desirable property of providing incentives to complete projects in a timely fashion. Looked at from the perspective of users, the Commission agrees with the sentiment that in other industries, including the airline industry, firms cannot charge users for services that they are not yet able to offer.

The Commission took the view that triggers of this kind, which permit remuneration only when the asset is operational, would not necessarily increase the cost of capital and in any case noted that users might be willing to incur a marginal increase in the cost of capital in exchange for linking payment for facilities with the time when those facilities are available.

Subsequently at the review of charges in 2009, the Commission included a trigger that increased the maximum level of airport charges per passenger only when the DAA achieved the milestone of making the second terminal operationally ready. Under this trigger, the Commission would allow an extra €635m into the RAB only when T2 was operationally ready (compared to the opening RAB of €836m).

Therefore pre-funding of T2 was not permitted by CAR.

A2. Unregulated UK infrastructure

In this section we examine how a number of major unregulated infrastructure assets have been funded:

- the M6 toll road;
- High Speed One; and
- Crossrail.



A2.1 M6 toll road

Overview

The M6 toll road, also called the Birmingham North Relief Road (BNRR), connects M6 Junction 4 at the National Exhibition Centre to M6 Junction 11A at Wolverhampton with 27 miles (43 km) of six-lane motorway. The M6 Toll is subject to the same regulations and policing as other motorways in the UK.

Proposals for a new publicly funded motorway were originally circulated in 1980. Five alternative routes were put forward for consultation in 1980 and a preferred route was published in 1986. In 1989 there was a public inquiry following which it was announced that a new motorway would be built privately. A competition took place which was won by Midland Expressway Ltd in 1991.

The contract was for a 53-year concession to build and operate the road as an early form of public private partnership with the operator paying for the construction and recouping its costs by setting and collecting tolls, allowing for a 3-year construction period followed by 50 years of operation. At the end of this period the infrastructure would be returned to the Government. Toll rates are set at the discretion of the operator at six-monthly intervals and there is no cap on the rates charged.

Cost and duration of build

Site clearance started in 2000 and the road was opened in December 2003 as Britain's first tolled motorway. The M6 toll road cost £485 million to build and Macquarie Infrastructure Group put the total project cost at £900 million.

Funding arrangements

In 1992, the UK Government granted a concession to Midland Expressway Limited (MEL) to obtain planning approval and then design, build, finance and operate the M6 toll road. Having progressed the scheme through the public inquiry and planning processes, including the preparation of an environmental impact statement, MEL arranged finance and tendering and negotiated the construction contract for the project. The project was developed without any direct government financial support.

In 2005 the House of Commons Transport Committee described the award as:

Midland Expressway Limited were awarded a 53 year concession to run the M6 Toll until 2054. The privately financed M6 Toll cost £485m to build and Macquarie Infrastructure Group put the total project cost at £900m. ... The total investment outlay to develop, design and build the M6 Toll was approximately £900m, with the only cost to the government being an £18m contribution towards rebuilding part of the connecting M42. The entire development cost (and risk) was transferred to the private sector." (House of Commons Transport Committee, 2005)

As the M6 toll road was a greenfield development with no existing customer base it was not possible for the project to benefit from customer pre-funding. The privately financed £900m investment in the M6 toll road, is made up of both equity and investment-grade debt in a structure to suit both the size of the investment and the long-term nature of the concession, which runs until 2054.



A2.2 High Speed One

Overview

High Speed 1 (HS1), also known as the Channel Tunnel Rail Link (CTRL), is a 108-kilometre high-speed railway between London and the United Kingdom end of the Channel Tunnel.

The line was built to carry international passenger traffic between the UK and continental Europe; it also carries domestic passenger traffic to and from towns and cities in Kent. The line, crossing over the River Medway and underneath the River Thames to London St Pancras railway station, opened in full on 14 November 2007. It allows speeds of up to 300 kilometres per hour (186 mph) on section 1 and up to 225 kilometres per hour (140 mph) on section 2. There are intermediate stations at Stratford International, Ebbsfleet International and Ashford International.

Cost and duration of build

Work on HS1 was carried out in two phases. Construction of stage one began in 1998 and was completed in 2003. Stage two began in 2001 and was finished in 2007. In total the link cost £5.8 billion to build.

Funding arrangements

The funding of HS1 involved a number of restructuring events following changes to the original plans.

In February 1996, the Government awarded a contract to London and Continental Railways Limited (LCR) to build, own and operate the link, and to own and operate Eurostar UK, the British arm of the Eurostar international train service. LCR agreed to raise private finance to construct the link and cover anticipated losses from Eurostar services in the early years of the concession. As part of the agreement, LCR would receive direct grants from the Government worth around £2bn.

In practice, demand for the Eurostar train service ran well below forecasts. By the end of 1997, LCR realised that it would not be able to raise the funds from the debt and equity markets that it needed to build the Link, so it turned to the Government for an increase in direct grants in return for a share in future profits.

The government agreed a financial restructuring with LCR, which included splitting construction of the Link into two distinct phases, bringing Railtrack Group into the project to purchase section 1 on its completion and altering the plans to raise private finance including through Railtrack guaranteeing a portion of debt and through the issue of Government Guaranteed Bonds.

When Railtrack failed in 2001, further changes were required to the financing of the project including the Government replacing the guarantee which had previously been provided by Railtrack. The Government also agreed that LCR could secure debt facilities against the remaining instalments of the Deferred Grant and that LCR could use the same financing mechanism that Railtrack Group had been preparing with LCR to finance the purchase of the section. LCR would raise funds from bond issues and bank debt that were secured against the income stream that LCR would receive from Eurostar UK for access to Section 1 and the Section 1 Domestic Capacity Charge.

By the end of 2003, LCR had secured all the finance that it considered it would require to complete construction of the Link, operate and maintain Section 1 and fund Eurostar UK losses in the medium term. Subsequent to the 1998 restructuring, LCR raised nearly £6.3



billion million of debt, comprising about £950 million of medium-term bank facilities and just under £5.3 billion of longer dated debt maturing between 2010 and 2051.

High Speed One benefitted from direct government financial support in the form of grants as well as government guarantees of some of the debt raised to finance construction. However, there was no pre-funding of the new link through customers paying higher rail fares.

A2.3 Crossrail

Overview

Crossrail is a 118-kilometre (73-mile) railway line that is under construction in England. It is due to begin full operation in 2018, serving London and its environs by providing a new east-west route across Greater London. It is one of Europe's largest railway and infrastructure construction projects. Crossrail's aim is to provide a high-frequency commuter/suburban passenger service that will link parts of Berkshire and Buckinghamshire, via central London, to Essex and South East London. The new line will relieve the pressure on several London Underground lines such as the Central and District lines which are the current main east-west tube passenger routes, and the Heathrow branch of the Piccadilly line.

The Department for Transport is jointly sponsoring the Crossrail programme with Transport for London. Crossrail Limited, a wholly-owned subsidiary of Transport for London, is delivering the programme, with Network Rail undertaking work to improve existing surface infrastructure to meet the needs of the new service.

Cost and duration of build

Work on Crossrail began in 2009 and is expected to be completed in 2018. The project is expected to cost £14.8 billion allowing for both contingency and expected inflation.

Funding arrangements

The Department for Transport and Transport for London have established a £14.8 billion funding package to build the infrastructure. The funding is a combination of direct grant funding from both bodies, borrowing by Network Rail and Transport for London, and contributions from businesses (including Heathrow Airport), and a supplement to London business rates.

As a greenfield development there is no existing customer base upon to which to increase charges to pay for the development of Crossrail. In theory, it would have been possible to levy an additional charge on users of the rail network or the London Underground system to help fund the project. However, the decision was made that the funding would come primarily from tax payers through direct government grants and levies on businesses in London. Heathrow's contribution to the construction – which will be passed on to airport users – is equivalent to around 0.5% of the total cost.

A3. Infrastructure investment in competitive markets

We have identified two case studies in which infrastructure is built in competitive markets:

- power generation; and
- mobile phone networks.

A3.1 The wholesale electricity market

There are strong parallels between the airport sector and the wholesale electricity market. In particular, capacity investment decisions in both sectors are very lumpy which can create a



mismatch between supply and demand with attendant consequences for availability, prices and service quality.

Under current industry arrangements, competing generators sell power through a wholesale market to retailers. Most electricity is generated at large power stations connected to the national transmission network. However, electricity can also be generated in smaller scale power stations which are connected to the regional distribution networks. Suppliers buy energy in the wholesale market and sell it on to customers. The transmission system is run by National Grid, which is responsible for balancing the system and making sure that the supply of electricity meets the demand on a second-by-second basis.

Investment in this industry depends on market prices. When there is a large capacity margin, prices are low and companies will judge that it is unprofitable to make new investments. Conversely, when capacity margins get tight, prices rise and signal to investors that there are sufficient revenues in the market to cover the operating and capital costs of new plant.

As an example of the results that this process has produced, Pembroke Power Station is a new combined cycle gas turbine (CCGT) plant which opened in 2012. It is the largest gas-fired power station in Europe currently generating enough power to supply 3.5 million homes and businesses. The building costs amounted to £1bn¹⁶, with a construction time of three years. The entire cost of the build was financed privately by the owners of the plant RWE npower with no revenues from customers during the construction phase.

While the market has historically delivered sufficient investment in capacity, the government has expressed concerns in recent years¹⁷ that the market may fail to bring forward sufficient capacity in the future. The government is also concerned that the market may fail to provide incentive for new capacity built to be sufficiently reliable, flexible and available when needed.

In response to these concerns the government and Ofgem have developed a new 'Capacity Market'. The Capacity Market works by determining administratively how much capacity is needed to ensure future security of supply. Competitive auctions are held four years and one year ahead of the year that capacity is required.

Generators who are successful in the auction will benefit from a steady, predictable revenue stream of capacity payments that encourages them to invest in new generation or to keep existing generation available on the system. The capacity obligation means they must be available to deliver energy when needed or face penalties. Subject to the legislation being finalised, the first auction will take place in December 2014 and will require capacity to be in place for 2018/19.

This means that investors in new power plant will, in the future, receive greater certainty over part of the future revenues they will receive. Nonetheless, the responsibility for funding new capacity remains with the generators who don't receive any revenue from the system until the new plant is built and delivering power.

A3.2 4G radio spectrum auction

In 2013, Ofcom auctioned licences for 4G radio spectrum to wholesale telecommunications service providers. The spectrum provided a significant increase over the spectrum already in use and raised proceeds of £2.4 billion spread over five network operators, EE (£0.6bn). Niche (BT) (£0.2bn), O2 (£0.6bn). Three (£0.2bn) and Vodafone (£0.8bn).

¹⁶ <http://www.rwe.com/web/cms/en/354304/rwe-technology-the-power-plant-specialist-in-the-rwe-group/company/news-press/press-release/?pmid=4008451>

¹⁷ See for example <http://www.parliament.uk/documents/impact-assessments/ia12-033k.pdf>



The operators have subsequently invested between £5 billion and £10 billion to upgrade their networks for 4G services.

To our knowledge, there has never been any suggestion that the operators have part-funded their investment by levying higher charges on existing users. The financial proposition is that the costs will be recoverable from the users that upgrade their plans to 4G services.

A4. Assessment

In this part of the study we have sought to carry out a survey of infrastructure funding profiles so as to flush out just how common or unusual pre-funding is.

We have looked at regulated infrastructure, unregulated infrastructure supported by government and privately funded infrastructure projects. A summary of the most salient features emerging from these case studies is set out in the table below.

Table A1: Summary of funding approaches in infrastructure industries

	Cost of build	Does the investment have an existing customer base?	Do users pre-fund investment in advance of assets coming into operation?	Is advanced funding made available by other stakeholders?
<i>Infrastructure investments in competitive markets</i>				
Power stations	-	✓	X	X
4G mobile networks	-	✓	X	X
<i>Discrete investments in regulated sectors</i>				
Large onshore transmission projects	tbc	✓	✓	X
OFTOs	£2bn+	✓	X	X
Thames Tideway Tunnel	£4.2bn	✓	✓	X
Northern Ireland gas networks	£200m	✓	X	✓
Heathrow T5	£4.6bn	✓	✓	X
Dublin Airport T2	€0.8bn	✓	X	X
<i>Investments in the unregulated transport sector</i>				
M6 Toll Road	£0.9bn	X	X	X
High Speed One	£5.8bn	X	X	✓
Crossrail	£14.5bn	X	X	✓

Of the infrastructure projects that we have considered, three of the eleven included explicit provision for customers to pre-fund a portion of the costs before the assets came into operation. In relation to Heathrow Terminal 5, there were two main reasons in support of revenue advancement. First, it was considered that without revenue advancement the airport would have faced substantial financing problems during construction due to the mismatch in the timing of its financing costs and the revenues from T5. Second, concentrating the



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increase in a one-off adjustment when the new Terminal opened would lead to an unacceptably large increase in the RAB and therefore the price cap.

In relation to the Thames Tideway Tunnel, Ofwat's justification for permitting pre-funding of investment was that this would reduce the financing costs of the project to be consistent with investment undertaken in the wider wholesale wastewater sector. Ofgem also permitted prefunding of the Caithness Moray Transmission Project on the basis that this would improve cashflow and reduce financing costs.



Annex 2: Indicative Calculations of the Cost of an 'AICC Policy' For New Airport Capacity Projects

<u>Heathrow</u> <u>2014 prices</u>											
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Opening AICC, £m	0	10	20	30	40	540	1340	2840	5040	8340	12040
New AICC, £m	10	10	10	10	500	800	1500	2200	3300	3700	3400
Closing AICC, £m	10	20	30	40	540	1340	2840	5040	8340	12040	15440
Average AICC, £m	5	15	25	35	290	940	2090	3940	6690	10190	13740
Return on AICC, £m	0	1	1	2	17	56	125	236	401	611	824
Pax, mppa	72	72.7	73.4	74.2	75	76	77	78	79	80	81
Charge per pax, £	0.00	0.01	0.02	0.03	0.23	0.74	1.63	3.03	5.08	7.64	10.18
WACC	5.35%	5.35%	5.35%	5.35%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
<u>Heathrow Hub</u> <u>2014 prices</u>											
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Opening AICC, £m	0	10	20	30	50	250	650	1650	2850	5550	8550
New AICC, £m	10	10	10	10	200	400	1000	1200	2700	3000	2700
Closing AICC, £m	10	20	30	40	250	650	1650	2850	5550	8550	11250
Average AICC, £m	5	15	25	35	150	450	1150	2250	4200	7050	9900
Return on AICC, £m	0	1	1	2	9	27	69	135	252	423	594
Pax, mppa	72	72.7	73.4	74.2	75	76	77	78	79	80	81
Charge per pax, £	0.00	0.01	0.02	0.03	0.12	0.36	0.90	1.73	3.19	5.29	7.33
WACC	5.35%	5.35%	5.35%	5.35%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
<u>Gatwick</u> <u>2014 prices</u>											
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Opening AICC, £m	0	10	20	30	50	250	750	1450	2350	3050	
New AICC, £m	10	10	10	10	200	500	700	900	700	600	
Closing AICC, £m	10	20	30	40	250	750	1450	2350	3050	3650	
Average AICC, £m	5	15	25	35	150	500	1100	1900	2700	3350	
Return on AICC, £m	0	1	1	2	11	35	77	133	189	235	
Pax, mppa	38	38.5	39	39.5	40	40.5	41	41.5	42	42.5	
Charge per pax, £	0.01	0.02	0.04	0.05	0.26	0.86	1.88	3.20	4.50	5.52	
WACC	5.70%	5.70%	5.70%	5.70%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	