

Appendix: Dublin Airport letter to the IAA Re: Cost of Capital Assessment dated 8th May 2026

Initial responses of Frontier Economics to the preliminary findings of Europe Economics

Introduction

On the 17th April 2026 Dublin Airport and the IAA held a workshop on the topic of WACC for the 2026 determination. At the workshop Europe Economics presented preliminary findings on a set of WACC topics.

This document sets out the initial responses of Frontier Economics to those preliminary findings.

We focus on key areas of disagreement between our work and that of Europe Economics. These areas of disagreement are not exhaustive and are based on the preliminary findings that were presented. We acknowledge that there are some parameters where there is a reasonable degree of alignment, but do not cover those in this document for brevity.

We focus on four parameters:

- Asset beta;
- Debt beta;
- Cost of new debt weighting; and
- Additional borrowing costs.

We set out our initial responses to each below.

Asset beta

With regards to asset beta, we respond on three topics:

- Estimation window;
- Frequency of data; and
- Cross-checks on the asset beta.

Estimation window

At the workshop, Europe Economics set out its preliminary position to rely on shorter-term 2- and 3- year estimation windows to estimate the asset beta. In summary, the justification cited was that this draws on latest market data which incorporates all previous market information.

We disagree that evidence from longer-term estimation windows should be disregarded when forming the asset beta range. This is for two main reasons:

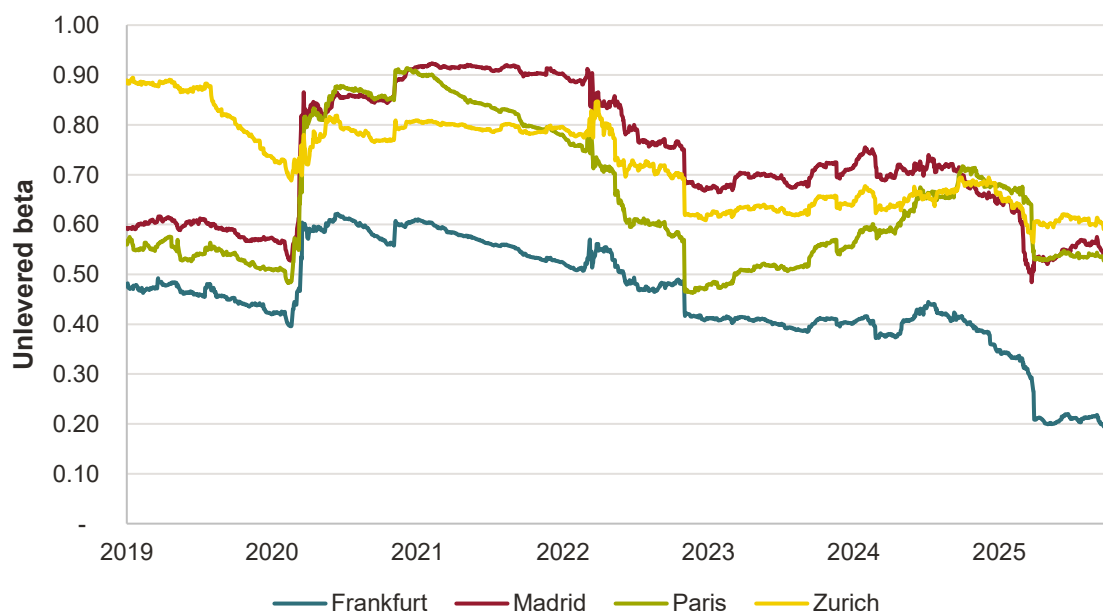
- Short-term estimation windows produce volatile estimates which are not suitable to set the asset beta for a 5-year control period.
- We disagree with the argument that the market has priced in all available information. This relies on the assumption that markets are perfectly efficient (known as the efficient market hypothesis). There is significant evidence that shows markets are not perfectly efficient.

We provide more detail on these two points below.

Volatility in short-term estimates

As shown in Figure 1 below, the 2-year daily unlevered betas have moved significantly over the last five to six years and fluctuate with daily stock market movements.

Figure 1 2 year unlevered beta estimates



Source: Frontier Economics, LSEG

Note: 2-year daily estimates based on the Stoxx 600

The 2-year unlevered beta estimates show a significant range of figures over time. Since 2019, the min-max range in estimates over time has been ~0.4 for each of the comparators and there has also been significant movements recently (not related to the large initial pandemic shock), for example, AENA's asset beta dropping from ~0.75 in 2024 to ~0.50 in 2025.

Setting an asset beta for a 5-year price control on the basis of volatile comparator estimates creates issues. These estimates change significantly over a short period of time, and therefore we cannot be confident that the estimates from this point in time are representative of the systematic risk for the full 5-year regulatory period and not liable to change substantially in the next five years.

Markets are not always perfectly efficient

One source of evidence against market efficiency is the existence of 'anomalies' that occur in the equity market. Anomalies present opportunities to make excess risk-adjusted profits. There is a substantial academic literature on the existence of these anomalies, with the wide number of factors driving those anomalies being labelled a 'factor zoo'.

Another source of evidence is that markets are susceptible to bubbles. Literature on financial crises highlights periods where mis-pricing occurs – where there are 'speculative manias', 'irrational exuberance' or other imbalances. Taking a short-term reading may therefore capture information from a period where mis-pricing of risk was occurring.

There are many other examples that raise doubt on whether a reading from a narrow-window is more reflective of the true-underlying risk of assets. And in a regulated setting, where there is assumed to be a stable regulatory framework, longer-run readings of data may provide information more insulated from temporary market conditions.

Common regulatory practice reflects the trade-offs involved with using data from a range of estimation windows.

Regulatory precedent

For the reasons set out above, it is common regulatory practice to use a range of estimation windows for setting the asset beta.

In the table below we set out recent precedent the UK and Ireland to demonstrate how extensively a range of estimation windows are used.

Table 1 UK and Ireland asset beta estimation windows

Regulator	Price control	Estimation windows
Ofgem	RIIO-3	2, 5 and 10 years
CRU	PR6	2 years but with up to 10-year averaging period
CAA	H8 Initial Proposals	2, 5 and 10 years
CMA	PR24	2, 3, 5 and 10 years

Source: Ofgem, CRU, CAA, CMA

In March 2026, the CAA, in its H8 initial proposals, used a range of estimation windows. It noted that the recent short run data, *“coincides with the pronounced, though temporary, fall in European stock markets and the announcement of tariffs by the US Government to be imposed on exports by various countries”*.¹

Rather than placing full weight on the data impacted by these recent developments, the CAA decided to also place weight on longer estimation windows, citing the UKRN guidance which states, *“the longer the sample of observations used, the more reliable (statistically robust) estimates will be, and the less heavily influenced by atypical and transient events which may not be representative of the ensuing control period.”*² Since the estimation for Dublin airport uses the same comparator set, the same logic applies for placing weight on longer term estimates.

Using a range of windows – or in the case of CRU, different averaging periods to capture data from different time periods – is considered regulatory best practice across different sectors:

- The CMA used 10-year betas to inform part of its range at the PR24 Final Determination and noted, *“There is a trade-off between using more recent data, which may be more relevant to market expectations of future risk, and longer estimation windows which improve statistical significance and may be less influenced by one-off events.”*³
- Ofgem has also held an established position since the RIIO-2 control period to place most weight on long term estimates as they *“should reduce the distortions caused by periods of high or low market volatility”*.⁴

¹ CAA (2026), H8 initial proposals

² UKRN (2023), “UKRN guidance for regulators on the methodology for setting the cost of capital”, page 23.

³ CMA PR24 FD, 7.442

⁴ Ofgem, RIIO-3 DD, Finance Annex 3.54

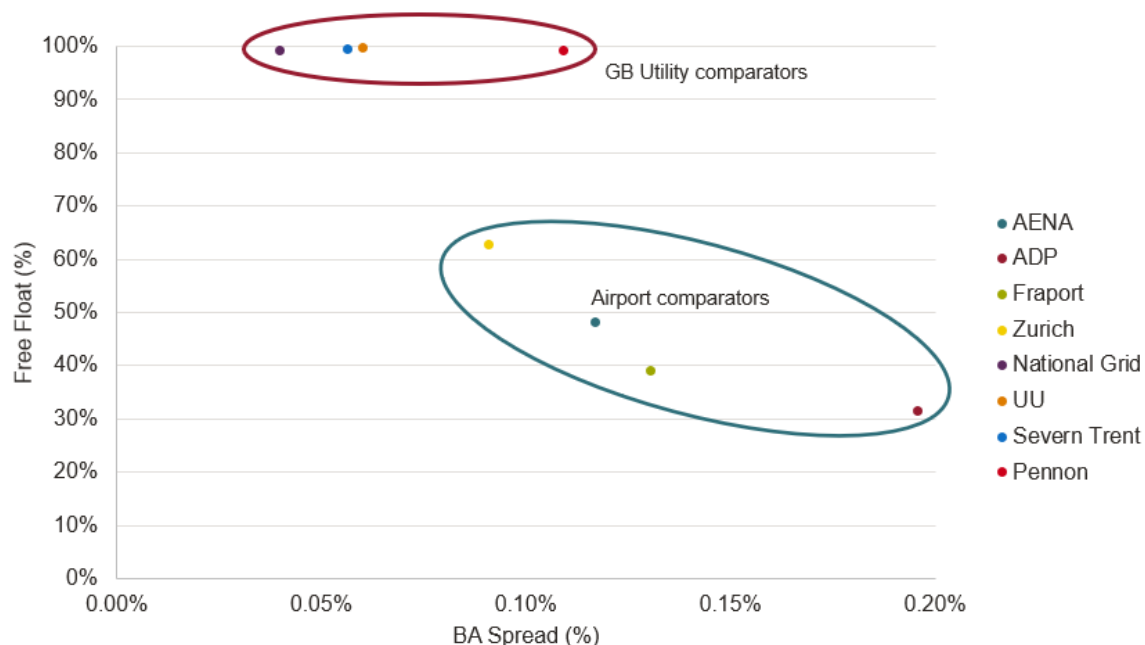
- CRU have used 2-year windows but with up to 10-year averaging periods in both the PC5 and PR6 determinations.⁵ While this approach uses short windows, the long averaging periods mean that 12 years of data is considered when assessing an appropriate asset beta range.

Frequency of data

Our understanding is that Europe Economics relies only on estimates derived from daily data. We consider that estimates based on weekly data should also be taken into account since the liquidity of the comparator sample is not as strong as comparators in other sectors.

Using weekly betas mitigates estimation error from stocks that have some liquidity issues.⁶ Relying on daily betas is common in other sectors but the comparator set is considerably more liquid. Figure 2 shows the percentage free-float and bid-ask spread of each of the comparator airports relative to utility comparators frequently used in Irish and UK regulation. Airports have materially lower free-float and materially higher bid-ask spreads.

Figure 2 Free Float and Bid-Ask Spread of airports relative to energy sector comparators



Source: LSEG

Note: 5-year average of data

⁵ See, for example, CEPA (2023), PC5 Allowed Return; CEPA (2025), PR6 Cost of Capital Estimation

⁶ Our work applies some filters to remove stocks with particular significant liquidity issues, but there airports that pass these minimum criteria can still have imperfect liquidity.

Both of these metrics show that the airport comparators are less liquid than those used in other regulated sectors. Given this evidence, we consider it prudent to also include weekly betas within the assessment of the asset beta range.

Cross checks on the asset beta

In the preliminary findings, Europe Economics shared views on 'conceptual positioning', setting out that Dublin Airport's asset beta should generally sit above Irish utilities, and should sit below its airlines.

While we agree on the former point of comparison, that the asset beta should sit above Irish Utilities, we:

- respond on the positioning points made, and
- note a key gap on conceptual positioning.

Response on positioning points

We would build on the framework set out by Europe Economics and point out that the asset beta of airports should sit clearly above the asset beta of utilities. The analysis presented by Europe Economics accepted all estimates so long as they were above a utility benchmark, but we would stress that the two ranges should not meet. There should be a clear gap between the two. It's hard to be precise how large that gap should be, but the Europe Economics framework, in principle, allows for the selection of an asset beta right on the cusp of the utility range.⁷

A key gap on positioning

We also note that Europe Economics did not comment on one of the most critical cross-checks we make in our March 2026 report, which is a cross-check against the asset beta of Heathrow Airport. This is periodically estimated by the CAA for the Heathrow Airport price controls.

We find that the asset beta of Dublin Airport should be above that of Heathrow Airport, due to the relative risk that each face. This is demonstrated by key differences between Heathrow Airport and Dublin Airport.

- Heathrow is significantly capacity constrained. At the time of the 2022 decision (as well as the CAA's H7 decision), demand was lower due to the effects of the pandemic. Since

⁷ We also note that airlines, unlike Irish Utilities, do not operate under a RAB-based regulatory framework where there are revenue or price-caps. They operate a business with a different structure to airports and other infrastructure. One key differentiator is the operational gearing that they face. Europe Economics does not highlight operational gearing in its comparison.

2022, we have seen demand recover strongly, and Heathrow is now capacity constrained again.

- Heathrow now has a traffic risk sharing mechanism (TRS) which significantly reduces demand risk at the airport.
- Dublin Airport also has a different traffic mix to Heathrow. According to OAG data for 2025, the proportion of Low Cost Carriers (LCCs) – in contrast to mainline network carriers – at Heathrow was 2% compared to 48% at Dublin Airport.

A failure to acknowledge this difference in relative risk would lead to an underestimation of the asset beta for Dublin Airport.

Debt beta

Europe Economics suggests that not assuming a debt beta in the asset beta calculation is a potential source of bias. It suggests that this is because the comparator airports have different levels of gearing to that of the Dublin Airport notional gearing. Europe Economics expressed its preference of having a positive debt beta assumption over the assumption of zero, despite the uncertainty in the appropriate levels of the debt beta and suggested that the uncertainty does not make zero a better assumption.

We do not agree that a debt beta must be included in the de-lever/re-lever formula. There are multiple options in the literature regarding the appropriate formulas to be used, and it is not clear to us that the Harris-Pringle formula is the only correct formula.

Levering formulas

In corporate finance theory, the equity beta to asset beta conversion is a process that involves many assumptions and there are a variety of formulas that are widely recognised. One option is the Harris-Pringle formula. However, other notable formulas include:

- The Practitioners' formula;
- The Hamada formula (also known as the Modigliani-Miller formula);
- The Fernandez formula; and
- The Miles-Ezzell formula.

Some of these formulas include the rate of the tax shield (e.g. Modigliani-Miller), some of them include the debt beta (e.g. Harris-Pringle) and some of them include a combination of these.

Which formula is most appropriate depends on the assumptions we make on the riskiness of the value of tax shield as a result of the treatment of debt in taxation.

The Harris-Pringle formula suggested by Europe Economics, includes a debt beta, and it implies three assumptions:

- the value of the tax shield is subject to the same risk as the equity capital and should be discounted using the cost of equity;
- the value of the tax shield is not guaranteed because the debt capital is subject to default risk and therefore the tax shield is also subject to default risk, this means that debt capital is sharing risk with the equity capital; and
- the market value of the debt capital is not fixed and changes with the net cashflow of the firm.

The formula recommended by Frontier Economics, is what is known as the Practitioners' formula, which is commonly used by investment banks, and notably by Irish regulators. This formula does not contain a debt beta, and it implies two assumptions:

- the value of the tax shield is subject to the same risk as the equity capital and should be discounted using the cost of equity; and
- the market value of the debt capital is not fixed and changes with the net cashflow of the firm.

Essentially, the difference between the two is whether the tax shield value is guaranteed or not due to the possibility of a default on the debt. In other words, by suggesting use of a positive debt beta in the de-levering formula, Europe Economics' method implies that the value of daa's tax shield is subject to the possibility of its debt defaulting and therefore daa's debt holders share some operational cashflow risks normally borne by the equity holder. Given the reality of daa's funding model, we are not convinced that the Harris-Pringle formula is the most appropriate for daa.

Regulatory precedent

To our knowledge, many non-UK economic regulators assume zero debt beta assumption in their CoE estimations, including the energy and transport regulators in France (CRE and ART), Spain (CNMC) and Germany (BNetzA). There is also no recent precedent for using the Harris-Pringle formula in Irish regulation, with CRU assuming zero debt beta in its recent decisions.

Estimation uncertainty

We also note the empirical challenges in estimating a reliable debt beta value. Direct estimation of debt betas – in a fashion consistent with equity beta estimation – often leads to a very wide-range of values and frequently results in negative debt beta values. The only method that can produce a somewhat sensible value is an indirect method where a premium is calculated deducting the risk-free rate and a default premium from the cost of debt, then dividing that by the equity risk premium. However, this indirect method is subject to all the

uncertainties involved in the intermediate steps such as the accuracy of the risk-free rate, default premium and ERP. In particular, the default premium is hard to estimate accurately independent of the cost of debt.

Overall conclusion on debt beta

As explained above, we have explored the various assumptions implied in different asset beta de-levering formulas and shown that the Harris-Pringle formula suggested by Europe Economics, although widely used in the UK, is not necessarily appropriate for daa, it is not used by most European regulators including Irish regulators, and is subject to significant estimation uncertainties. Including a debt beta therefore in our view does not improve the accuracy beta estimation for daa in relation to setting the appropriate equity return.

Cost of new debt weighting

The cost of new debt weighting in the Frontier March 2026 report is 52%. This is higher than in past charging periods due to the large capital expenditure programme proposed in the Dublin Airport business plan.

We agree that the share of new debt should be tailored to the scale and timing of CAPEX approved for the regulatory period, as the amount of financing required will vary depending on the scale CAPEX. We draw on figures consistent with the business plan of Dublin Airport in our report.

However, during the workshop discussion it was noted that outturn CAPEX could be lower than forecast at the start of the period e.g. due to planning issues. There appeared to be a potential concern about WACC over-estimation in a scenario where outturn CAPEX was lower than forecast – as actual new debt proportion could be lower than forecast new debt proportion.

We understand this risk in principle, but we wish to point out that the risk is not one-way, it is two-way. For example, it is common for infrastructure schemes to go over-budget. In other words, that outturn CAPEX is greater than forecast. In this situation the airport may need more new debt than initially forecast.

It is common in regulatory decisions that there is an ex-ante forecast of the cost of new weighting based on financing assumptions consistent with the expenditure profile of the company.

It is also important to note that under-estimating the weighting on new debt could heighten financeability risks, as a lower cost of debt reduces the WACC – and in turn the cashflows allowed for in the determination.⁸

Additional borrowing costs

The efficient level of cash

The preliminary findings document notes that, “It will be important to understand the efficient level of cash holdings relative to debt”, as, “This will help assess whether implied carry and liquidity costs are reasonable.”⁹

In responding to these points we note that Dublin Airport plans to use the bond market for raising debt over the 2027-2031 period.

When it comes to bond issuance, it is common for regulated infrastructure companies to issue bonds that are of ‘benchmark size’. Currently, in the Euro market, that benchmark size is €500m.¹⁰ The advantage of issuing a bond of benchmark size is greater liquidity. Better liquidity reduces the liquidity risk premium that investors demand when holding debt, allowing the overall cost of borrowing to be lower than a non-benchmark equivalent.

By issuing benchmark size bonds, there is a trade-off though, as the business has to carry cash until it can be deployed. However, we make two observations on this trade-off:

- First, the issuance of benchmark size bonds is very common across infrastructure companies. Meaning that treasury departments find this an efficient solution to overall cash management. If it was inefficient, we would expect to see treasury departments taking alternative approaches.
- Second, some of the costs of issuing debt are fixed. This means that issuing small sums of debt more frequently will, proportionally, have a higher issuance cost.

We find that there is an observable preference for issuing benchmark bonds and carrying cash compared to an alternative of issuing in smaller amounts more frequently which:

- (a) may have a higher yield at issue due to worse liquidity, and
- (b) will have proportionally higher issuance costs as some of these costs are fixed.

⁸ The WACC is lower where the weighting on new debt is lower in this specific situation as the cost of new debt is greater than the cost of embedded debt.

⁹ Europe Economics (April 2026), Preliminary findings for Dublin Airport WACC.

¹⁰ [iBoxx EUR Benchmark Index Methodology](#)

It is also important to note that credit rating agencies consider the level of liquidity that Dublin Airport has when reaching a view on credit rating. Liquidity that is constrained could have a negative impact on the overall rating of the airport, in turn raising the cost of debt faced by the airport in the market.

Lastly, we highlight that our approach to estimating liquidity costs was a cautious one. Specifically, we estimated that cash liquidity costs were higher at the start of the regulatory period, falling significantly over time. We only drew on data from the end of the period when estimating the allowance used in our report.¹¹

Regulatory precedent

Additional borrowing costs are estimated as 30bps in the March 2026 Frontier Economics report. During the 17th of April workshop the topic of how this compares to other regulatory decisions was discussed. Below we set out further information on recent decisions on additional borrowing costs – building on the data provided in our March 2026 report – demonstrating that 30bps is within the range of other regulatory decisions. Specifically, it is within 1bps of the allowance for gas distribution and gas transmission companies in GB.¹² And is below the allowance made for gas distribution companies in Northern Ireland.

Table 2 Recent regulatory precedent cross-sector and cross-jurisdiction

Regulator	Price control	Additional borrowing costs	Notes
CRU	PR6 Final	10-20bps	Excludes RCF costs as these are allowed for as a separate cost item.
UREGNI	RP7 Final	15bps	-
CMA	PR24 Appeals Final	20bps	-
CAA	H8 Initial Proposals	19bps	-
Ofgem	RIIO-GD3/T3	25-29bps	25bps for ET, 29bps for GD/GT. We have excluded any CPIH basis mitigation related amounts.
UREGNI	GD23 Final	33-41bps	33bps for PNGL, 41bps for Firmus, 37bps for SGN

Source: Various regulatory publications

¹¹ We used a value of 20bps for cash liquidity costs, which is the average of the 2030 (17bps) and 2031 (23bps) figures we calculated.

¹² The Ofgem RIIO-3 Final Determination was published in December 2025.

Treatment of the RCF

Revolving Credit Facilities (RCFs) are a common tool for managing liquidity. Dublin Airport, like many other regulated businesses, has access to an RCF.

It is important that a regulated business has sufficient liquidity in an efficient manner. Both from a resilience point of view and because it is a factor that credit rating agencies consider when assessing the overall risk of lending.

Allowing for some RCF costs is commonplace in regulatory decisions. And we also found it appropriate to make some allowance for RCF costs in our report.

Specifically, as we had already estimated liquidity costs separately, we only allowed for the upfront and ongoing fees associated with maintaining an RCF. We assumed zero drawdown of the facility to avoid any potential double counting.

Conclusion

We welcome further engagement on these key areas of disagreement. Each of the topics raised have a material impact on the WACC. Ensuring they are appropriately estimated for the 2026 determination is important for Dublin Airport's ongoing access to capital markets throughout the 2027 – 2031 period.