International Airlines Group

Slot Asset Values Exist Without Excess Airline Returns

Lessons Provided from Outside Aviation

Prepared for Regulatory and Policy Review

Core conclusion

Frontier has mistaken the price of a scarce asset for a passenger-paid fare premium.

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1 Executive Summary

1.1 Heathrow argues that its £49 billion expansion is affordable because it erodes an existing "congestion premium" currently paid by point-to-point passengers in fares. Frontier Economics' 2025 CBA[Frontier Economics, 2025, pp. 48–52] places the value of this premium at £3.5 billion a year. The Government and the CAA are being asked to consider whether expansion can be funded by recovering a share of the premium through higher airport charges.

1.2 This figure is built on the same econometric foundations as Frontier's 2019 study. In that earlier work, Frontier attempted to corroborate its econometric model by triangulating it against Heathrow slot sale prices, finding a £2 billion premium via slots[Frontier Economics, 2019, p. 46] versus £2.4 billion via econometrics[Frontier Economics, 2019, p. 68]. This triangulation is the linchpin of the entire methodology. If the slot-based valuation is flawed, the econometric estimate is only supported by a top-down analysis, stripped of its strongest independent corroboration.

1.3 The 2019 £2 billion figure is wrong, and it is wrong in a way that matters for the regulatory policy decisions. Frontier infers from a thin sample of slot transactions that Heathrow fares contain a hidden premium of roughly £91 per return point-to-point passenger, totalling £2 billion a year, paid by passengers and collected by whoever holds the slot.[Frontier Economics, 2019, pp. 40–42]

1.4 Frontier's logic breaks at three points: method, visibility, and arithmetic.

1.5 **The method is wrong.** Frontier's central assumption is that the price an airline pays for a slot must equal the present value of a route-level fare premium it expects to recover[Frontier Economics, 2019, p. 42]. A slot is not that. A slot price captures a bundle of value: the long-term right to operate at Heathrow at all, the right to redeploy across routes and aircraft, network feed into long-haul connections, schedule reliability, and the strategic value of preserving access where re-entry is uncertain.

> **Frontier's method capitalises a bundle of asset value, spreads it over a ten-year asset life, and renames the result a "congestion premium" that passengers pay each year.**

1.6 It is helpful to compare to another market for scarce long-lived assets, for example farmland. Applied to English farmland the same arithmetic would imply an "agricultural premium" that dwarfs every farmer's actual income. DEFRA's most recent estimate puts the median return on capital for English commercial farms at *negative* 0.1%[DEFRA, 2025] while the average farm value was £2.5 million. Land prices reflect scarcity, location, planning options and the premium some buyers attach to lifestyle. None of that proves the price of strawberries at the farm gate is above what an unconstrained market would charge. The land is expensive; the operations do not cover their cost of capital. The same pattern holds at Heathrow: expensive slots, sub-economic airline returns.

1.7 **The premium fails the visibility test.** If Heathrow passengers really were paying £91 more per return trip in 2018[1] than they would in an unconstrained market, the £2 billion would have to materialise somewhere observable. It would show up as higher fares, higher airline profits or higher airline costs absorbing the increased fares, and likely higher load factors. IAG's March 2026 paper, *Empirical Tests of the Starting Scarcity Rent Hypothesis at Heathrow*, tested all four. None shows the premium. Like-for-like fares between Heathrow and Gatwick are not systematically higher once airport charges are controlled for. Carrier EBIT margins at Heathrow average 9.7%, below the 10.5% the industry needs to cover its cost of capital across the cycle. Heathrow load factors are 80.9%, below Gatwick's 84.8%. Higher Heathrow unit costs are explained by airport charges and cabin density, not by hidden margin capture.

1.8 **The premium fails the arithmetic test.** In 2025 Virgin Atlantic raised $745 million in secured financing backed by its Heathrow slot portfolio. Reverse-engineered across the airport, the financing implies a total slot portfolio worth roughly £25-30 billion. Capitalised at standard HMRC rates, that produces an implied annual income stream of approximately £3.45 billion. Oliver Wyman's independent estimate of total airline EBIT at Heathrow is also approximately £3.1 billion.[Oliver Wyman, 2026, p. 8] For Frontier's congestion premium to coexist with normal airline returns, Heathrow's airlines would need to be earning £3.5 billion *on top of* £3.1 billion of normal-return EBIT. The audited accounts do not contain that money. The Heathrow record reinforces the point: bmi, once Heathrow's second-largest carrier, lost money for years and was sold; Virgin Atlantic's Little Red attempted domestic flying from Heathrow and failed inside two years; Lufthansa, Air France-KLM, Iberia and SAS have spent two decades cutting Heathrow short-haul services. That is not the behaviour of airlines collecting a significant premium on point-to-point passengers.

1.9 A single calibration error compounds the conceptual one. Frontier assumes airlines hold slots for ten years. Slots are in fact held in perpetuity under the international 80/20 use-it-or-lose-it rule, and over the last thirty years there is no material example of a slot being lost in this way by an airline that wished to retain it. Truncating the holding period to ten years inflates the implied annual rent by approximately 94% before any other adjustment.[2]

1.10 What the CAA does next matters. If it accepts the 2019 slot-value approach as support for a congestion premium included in fares, it risks approving an expansion programme funded on a fare premium that does not exist. The shortfall would need to be made up through some mixture of higher fares, lower airline returns, likely leading to route cuts and short-haul exits to Gatwick, Stansted and Luton. The hub system that makes Heathrow valuable in the first place could easily fall into a death spiral of higher charges and airline exits.

The slot-value triangulation approach should not be relied upon. It does not measure what passengers pay above a competitive benchmark, what airlines earn, or what expansion could recover. It is an artefact of a method that confuses the price of a scarce asset with a fare premium that has not been observed.

[1] In the 2025 CBA, the £91 has risen to £138 per point-to-point return passenger; see [Frontier Economics, 2025, p. 50] and [International Airlines Group, 2026, p. 16] for total and one-way per passenger figures for 2023

[2] Full derivation: if a slot is treated as a perpetual access right, consistent with the 80/20 'use it or lose it' grandfathering rule, its annual premium is derived as a perpetuity (C_∞). The ratio of an n-year annuity premium (C_n) to this perpetual baseline, given the same present value, is exactly $1/(1-(1+r)^{-n})$. At $r = 0.075$ and $n = 10$, this inflation factor is approximately 1.942. By truncating the holding period to 10 years, Frontier's method mechanically increases the required annual rent by over 94% before any adjustments for network or option value are considered.

2 Business Lens

2.1 IAG supports expansion at Heathrow, but not at any cost. The question this submission addresses is not whether to expand, but whether the regulatory policy and affordability judgments underpinning expansion is built on an assumption of congestion premium that does not exist. We specifically contend that slot prices have been mistaken for a passenger-paid fare premium, which is not visible in the actual fares passengers pay, the actual returns airlines earn, and the actual operating economics of the carriers that will fund the expansion and fly the passengers it is meant to serve.

What Frontier claims, and where its logic fails

2.2 Heathrow slots trade for high prices. Some have changed hands for £40 million or more. Frontier Economics concludes from these slot sale prices that there must have been a fare premium of approximately £91 per return point-to-point passenger embedded in ticket prices, accruing to whoever operates the slot, totalling £2 billion a year across the airport in 2018. The reasoning is that no airline would have paid millions for a slot unless it expected to recover the price through a corresponding stream of excess revenue from passengers when airlines could deploy capacity to other airports where they would not have to pay for a slot.

2.3 The reasoning fails at the first step. A slot is not an entitlement to extract a route-level congestion premium from passengers. It is one input in a complex operating system, and its price reflects the value of the whole system to a specific buyer. The same slot can be loss-making in one airline's network and valuable in another's. The two largest commercial tests of slot scarcity at Heathrow in the last fifteen years both ended in operator failure or significant retrenchment. Slots, by themselves, do not produce a fare premium. They are one component of an operation that does or does not work.

2.4 This section explains in commercial terms why Heathrow slot values are consistent with the absence of an airport-wide fare premium. It draws on the four channels in which any such premium would have to appear (fares, profits, costs and load factors), the financial history of the largest short-haul operations, and the arithmetic of the two recent slot-related transactions Heathrow Airport has cited as evidence of excess passenger payment.

What a Heathrow slot actually is

2.5 A slot is the right to use a runway at a specific time on a specific day. At Heathrow, where the runways are full, that right is scarce. Slots are allocated under the international 80/20 use-it-or-lose-it rule: hold them, use them and they remain yours indefinitely. Most Heathrow slots in use today were not bought. They were inherited under historic rights, awarded through entry processes, or transferred during alliance restructuring. Over 99% of summer 2022 weekly slots were held under historic rights, according to the Department for Transport.

2.6 Secondary slot trading by airlines is permitted in the UK regulatory regime. At many other major hubs, including Frankfurt, Paris CDG, Madrid, Amsterdam, Munich and Rome airlines perform slot swaps, but not trading for cash. That is a regulatory choice, not a statement about the value of access at those airports.

2.7 Within Heathrow, slot values vary. The handful of publicly reported transactions in the last thirteen years show price variation of roughly 8x between the highest and lowest reported deals. The drivers are time of day, portfolio composition and transaction size. Early-morning long-haul arrival slots command the highest prices. Off-peak slots used for short-haul flying do not.

2.8 Public-knowledge transactions are also rare.

Table 1: Public-knowledge slot sale transactions, 2013 to 2025

Year	Daily slot pairs	% of LHR slots in use
2013	5	0.8%
2014	7	1.1%
2015	8	1.2%
2016	2	0.3%
2017	2 5/7	0.4%
2018	-	0.0%
2019	-	0.0%
2020	1	0.2%
2021	-	0.0%
2022	-	0.0%
2023	-	0.0%
2024	1	0.2%
2025	-	0.0%
Annual average	2.1	0.30%

Source: IAG research of publicly reported ACL slot transactions with values, 2013 to 2025.

2.9 The historical data shows an average of 2.1 daily slot pairs per year, equivalent to roughly 0.3% of slots in use. Frontier's analysis takes that thin sample (through 2017), calculates an average price per slot of £812,000, multiplies it by the airport's 18,500 slots to derive a £15 billion total slot value, and treats that figure as the present value of a route-level fare premium. It then divides by an assumed 10-year asset life to produce a £2 billion annual premium.

2.10 Note: The 2012 IAG acquisition of bmi, the largest single transaction in the public record at a price point that implies roughly £4 million per annual slot pair (or £146K per slot using the Frontier methodology assuming the airline had no value), was not included in the Frontier analysis. This would have significantly lowered the overall average slot value.

Why the slot price does not measure a fare premium

2.11 Eight features drive what a Heathrow slot is worth to a particular buyer. Each is real. Most have nothing to do with a route-level fare premium that Frontier's framework assumes the slot price captures.

Figure 1: What makes a Heathrow slot valuable

Driver	What it captures
The right to fly at all	A slot is the prerequisite for any service at Heathrow. Without it, there is no operation and no underlying cash flows.
The right to redeploy	Slots can be moved across routes, between aircraft sizes and between alliance partners as the network evolves.
The right to sell or lease	UK rules permit secondary transfer. That liquidity has value distinct from operating value.
Constrained supply	New slots cannot be created without physical or regulatory change to the airport.
Network feed	A slot used for short-haul flying may feed long-haul connections that earn well, even if the short-haul route does not.
Schedule reliability	Stable slot holdings underpin schedule consistency, which ensures longer booking windows and customer confidence to book.
Strategic optionality	Exit from Heathrow is hard to reverse. Holding a slot preserves the option to operate in the future.
Buyer-specific value	A long-haul carrier and a short-haul carrier value the same slot differently. The marginal buyer's price is not the average holder's economics.

2.12 A buyer paying £40 million for a annual slot pair (£1.4 million per slot) is paying for the whole bundle. Frontier's framework assumes the buyer is paying solely for the right to extract a route-level fare premium from passengers. Even on Frontier's own assumption that the buyer just breaks even on the transaction, the framework requires that the entire slot price be the present value of that single value stream. It cannot be: most of the eight drivers above describe value that has nothing to do with passenger payments above a competitive benchmark.

2.13 The same logic applies in any market for scarce, long-lived assets. UK farmland trades at prices far above what crop or livestock margins alone would justify, because buyers also price scarcity, planning potential, alternative use, consolidation value and amenity. A field next to a developer's existing holding can sell for many times its agricultural value. That price tells you about the developer's plans, not about the price of wheat.

The slot is the same; the value is not

2.14 A long-haul operator can support a £40 million slot purchase at normal commercial returns, with no fare premium required. Using Oliver Wyman's 2024 estimate of £62 EBIT per passenger for Heathrow long-haul, a typical long-haul slot pair generates around £12 million to £17 million per year of free cash flow. Discounting those free cash flows at a 8.2% WACC for a long enough period of time, the expected return is in line with the threshold required to cover the industry cost of capital. No supernormal margin is needed for the purchase to make commercial sense.

2.15 A short-haul operator cannot. At the Oliver Wyman 2024 short-haul margin of 2.3%, the same slot generates insufficient cash flows to justify the same purchase price. A short-haul operator paying £40 million for the slot is either pricing redeployment optionality (the right to shift the slot to long-haul or larger aircraft over time) or making a mistake.

2.16 This explains why the same Heathrow slot, in the hands of different airlines, yields very different commercial outcomes. It also explains why slot prices cannot be averaged across the airport and converted into an airport-wide premium. The marginal buyer in a thin market sets the price, and the marginal buyer is whoever can extract the most value from the asset within their own network. That value is not the same as a uniform fare premium charged to passengers.

The four channels test

2.17 Frontier's 2025 CBA claimed that Heathrow passengers pay roughly £3.5 billion a year more for their tickets than they would in an unconstrained market. If that were true, the £3.5 billion would have to materialise somewhere observable. There are only four channels through which it could appear, and IAG's March 2026 *Empirical Tests of the Starting Scarcity Rent Hypothesis at Heathrow* paper has tested each one.[International Airlines Group, 2026]

2.18 **Profits.** If the premium is collected by airlines, it should appear in elevated EBIT margins. BA and Virgin Atlantic together, the two carriers most exposed to any meaningful Heathrow rent under Frontier's logic, earned approximately £1,333 million less in 2024 than Frontier's framework would predict, a 71.9% shortfall. Oliver Wyman's study of 2024 results reports a 9.7% blended EBIT margin across all Heathrow operations, with long-haul at 10.9% and short-haul at 2.3%. The blended figure sits below the approximately 10.5% that the industry requires across the cycle to cover its cost of capital. The premium does not appear in profits.

2.19 **Costs.** If a fare premium exists and is collected as revenue it could dissipated through higher costs and the profits wouldn't be visible, but high costs would be visible. The Empirical Tests paper finds the opposite. Heathrow's higher unit costs are fully explained by Heathrow's higher airport charges and by cabin-density choices. No residual hidden margin is identifiable.

2.20 **Load factors.** If passengers are willing to pay a premium for Heathrow access, demand should clear at higher load factors than at less constrained airports. Heathrow's 80.9% load factor is below Gatwick's 84.8%. The premium does not appear in passenger willingness to pay either.

2.21 **Fares.** This is the most direct test. If passengers are paying a premium, fares at Heathrow should be systematically higher than at unconstrained London airports on like-for-like routes. The Empirical Tests paper compares Heathrow to Gatwick on overlapping routes flown by overseas carriers, controlling for airport charges. There is no systematic Heathrow fare premium on like-for-like products for sale at the same time. The premium does not appear where it most directly should.

2.22 A claim of a £3.5 billion annual airline collected congestion premium that is invisible across all four channels in which it would have to appear is not, properly speaking, a measurement.

The carrier behaviour record

2.23 If Heathrow access generated an extractable fare premium, carriers would compete to enter and stay. They would not be cutting capacity, exiting routes, or selling out. The record shows the opposite.

2.24 **Major European carriers.** The pattern across larger operators is the same. Between 2005 and 2025:

- Iberia cut Heathrow departures by approximately 51%, leaving Madrid as its only remaining Spanish destination.
- Air France-KLM cut by approximately 49%, withdrawing from Eindhoven, Lyon and Rotterdam. In late 2025, Air France leased out a Heathrow Nice slot and opened a new Gatwick to Paris CDG service rather than redeploying that slot on Heathrow to Paris CDG.
- SAS cut by approximately 34%, withdrawing from Gothenburg and Stavanger.
- Lufthansa Group shifted approximately 39% of its Heathrow-to-Germany flying from mainline Lufthansa to lower-cost group affiliates.
- Lufthansa Group sold loss-making bmi to British Airways.
- Virgin Atlantic started Little Red, a short haul carrier, with remedy slots from the bmi transaction and closed it after disappointing results.
- TAP Air Portugal consolidated to a single Lisbon route, cutting overall Heathrow departures by 17% from 2005 levels.
- Cyprus Airways, Luxair, TAROM and airBaltic exited Heathrow entirely.

2.25 That is not the behaviour of airlines protected by an airport-wide fare premium that flows to whoever holds a slot. It is the behaviour of airlines responding to commercial pressure on short-haul Heathrow flying. *(Detailed carrier-by-carrier route data are available from IAG upon request.)*

The Virgin Atlantic financing places a ceiling on the premium

2.26 In 2025, Virgin Atlantic raised $745 million in secured financing backed by its Heathrow slot portfolio. Heathrow Airport has cited the transaction as direct evidence that Heathrow slots embed substantial collectable value. The arithmetic places a ceiling that Frontier's claim cannot survive.

2.27 On a 49% loan-to-value assumption, the financing implies that Virgin's Heathrow slot portfolio is worth approximately $1.5 billion. Virgin holds roughly 4% of Heathrow slots. Scaled across the airport, that implies a total slot portfolio worth around £25-30 billion. (Virgin's slots are weighted toward higher-value early-morning long-haul arrivals, so this overstates the average.)

2.28 Now ask what annual income stream that £25-30 billion capitalises. Using HMRC's published Writing Down Allowance (WDA)[HMRC, 2026, p. CA23220] rates for asset valuation, in the range of 6% to 18%, the implied annual income falls between £1.5 billion and £5.4 billion, with a midpoint of approximately £3.45 billion.

2.29 Oliver Wyman's 2024 independent estimate of total airline EBIT at Heathrow is approximately £3.1 billion[Oliver Wyman, 2026, p. 8] across all operators and from all flying. That is the entire airline profit pool at the airport.

2.30 The implication is detrimental for Frontier's slot-valuation framework. The Virgin financing captures

the total operating profit of the airport's airlines. Frontier uses the Virgin slot financing to make the case for their updated 2023 estimate of congestion premiums of £3.5 billion. For Frontier's £3.5 billion premium to coexist with normal airline returns, Heathrow's airlines would need to be earning £3.5 billion of premium *on top of* a £3.1 billion normal-return EBIT base, producing roughly £6.5 billion of total income capitalised in slot value. The Virgin financing implies no such number. It implies a £3.5 billion profit pool. The 9.7% blended EBIT margin that the Oliver Wyman £3.1 billion figure represents sits below the approximately 10.5% threshold the industry needs to cover its cost of capital across the cycle. The financing markets are not financing an extractable premium of the size Frontier identifies.

What this means for expansion policy

2.31 Two policy claims rest on Frontier's analysis. The first is that Heathrow expansion can be funded by recovering a share of the alleged £3.5 billion congestion premium through higher airport charges, on the reasoning that airlines hold the premium today and would simply absorb the recovery from their existing collections. The second is that expanding Heathrow will reduce ticket prices by eroding the premium.

2.32 Neither holds, because the premium is not there to recover.

2.33 There is no premium to redirect. The four-channels test shows it is absent from observable fares, profits, costs and load factors. Short-haul operations at Heathrow run on EBIT margins of 2.3% on Oliver Wyman's 2024 analysis. Long-haul margins of 10.9% sit only modestly above the cost of capital. In neither segment is there room to absorb a step-change in airport charges without consequence. Airlines do not absorb higher costs; they raise fares, cut routes or leave. Air France's 2025 decision to lease out a Heathrow slot and open a Gatwick to Paris CDG service instead is the first illustration. There will be more.

2.34 The expansion-lowers-fares argument fails for the same reason in reverse. If new capacity is funded by adding £49 billion to Heathrow's regulated asset base, the cost of that capacity comes back to airlines as higher charges. The theoretical erosion of an inferred premium that has never been measured in fares cannot offset a real increase in infrastructure costs. Passengers do not pay less to fly from a more expensive airport on the strength of a premium that the data has never shown.

2.35 The only viable expansion path is a smaller capital envelope than the £49 billion currently proposed, combined with regulatory reform that introduces cost discipline and risk-sharing into delivery. Without both, no allocation of charges produces a stable commercial outcome.

3 Economist Lens

Frame

3.1 Frontier Economics' 2019 report, *Estimating the Congestion Premium at Heathrow*, makes a precise analytical claim that should be stated precisely before being rebutted. The claim has four components. First, in a competitive market with spare capacity, fares would equal long-run marginal cost (LRMC), defined to include variable operational costs, the long-run cost of capacity (including aircraft finance) and route-related overheads. Second, at a congested airport, fares exceed LRMC by an amount Frontier terms the "congestion premium," paid by passengers and accruing to whoever holds the slot. Third, slot prices capitalise the present value of the future premium, on the working assumption that a buying airline just breaks even on the slot transaction (so that NPV of expected premium = upfront price paid). Fourth, multiplying the average observed price per slot by the airport's slot count and dividing by an annuity factor yields the implied total premium. Frontier's central estimate is £2.0 billion per year (2018), or approximately £91 per point-to-point return passenger.[3]

3.2 The framework can be challenged at every step. This section does so in three layers.

3.3 The first layer is conceptual. Frontier's stock-to-flow conversion treats the entire slot price as the present value of a single value stream (a route-level fare premium above LRMC). The slot price actually capitalises a bundle of value streams, of which a theoretical route-level premium is at most one component. This is the central category error. Even if the LRMC framework were otherwise sound, the slot price cannot be uniquely attributed to the premium.

3.4 The second layer is the LRMC benchmark itself. Frontier's "premium above LRMC" is defined relative to a competitive-market benchmark that excludes enterprise-level overhead. A fare above narrow LRMC may simply fund costs LRMC leaves out (head-office, brand, technology, loyalty, distribution, enterprise capital). A premium above LRMC therefore does not equal a "rent" in the regulatory sense of an economic profit above the cost of capital. The relevant regulatory benchmark is the carrier's full cycle-average cost of capital. Heathrow operators do not clear that benchmark on average.

3.5 The third layer is empirical. A premium of the size Frontier identifies must materialise in one of four observable channels: fares, profits, costs (absorbing the rent) or load factors. IAG's March 2026 *Empirical Tests of the Starting Scarcity Rent Hypothesis at Heathrow* paper tests all four. None shows the premium. The methodological errors in Frontier's calibration (sample size, sample exclusion, asset-life truncation, treatment of non-tradable hubs, marginal-buyer pricing) compound the conceptual errors and explain most of the gap between Frontier's £2 billion 2019 figure and observed airline outcomes.

[3] Methodology and results discussed in Frontier Economics, *Estimating the Congestion Premium at Heathrow* (2019), [Frontier Economics, 2019, pp. 36–46]. Frontier's central case: average observed price per slot of £812,000, scaled across approximately 18,500 slots at Heathrow, capitalised at a 7.5% WACC over a 10-year asset life, yielding an implied annual premium of £2.0 billion. CAA Website

Layer 1: Stock-to-flow conversion is a category error

3.6 Frontier's foundational claim is contained in a single passage:

> "If an airline is prepared to pay additional sums of money to acquire a slot this *must signify* that the airline believes it can use that slot to earn a premium above this long run marginal cost. If there were no premium, then paying for the slot would make no sense."[4]

3.7 The claim is true in a narrow sense. A buyer who pays for a slot must believe the slot will generate value exceeding its purchase price. The fallacy is in what follows. Frontier identifies that value with a route-level fare premium above LRMC, and from there infers an annual flow that can be scaled across the airport.

3.8 The capital value of a scarce, indefinite-life, network-complementary access right is the present value of every benefit stream the right confers on its holder. Those streams include the right to operate at all (a binary access option whose value is positive whenever Heathrow demand exceeds capacity), the right to redeploy across routes, aircraft gauge, alliance or joint-business portfolios, and service types as the holder's network evolves, the right to sell or lease the slot under the UK secondary-trading regime, the hub-feed contribution under which a slot used for short-haul flying may generate negative standalone profit while supporting positive long-haul cash flow elsewhere in the network, and strategic optionality including the value of preserving access in a system where re-entry at peak times and at scale is uncertain.[5]

3.9 A buyer paying £40 million for a Heathrow slot pair is paying the present value of this entire bundle. Decomposing that price into a single annual operating premium above LRMC, as Frontier's framework does, requires the additional assumption that all other components of value are zero. That assumption is unsupported and inconsistent with how airlines actually deploy slot capacity. Frontier's "lower bound" qualification (the assumption that the buyer just breaks even, so that NPV of premium = price) does not rescue the framework. Even if the buyer breaks even, the slot price equals the NPV of *all* benefit streams, not the NPV of a route-level premium specifically. Attributing the entire price to one stream overstates that stream by the value of every other stream excluded.

3.10 The Crouzet and Eberly framework on average-Q versus marginal-q with multiple capital types makes the same point in a different language.[6] When a firm operates with multiple complementary capital stocks, the average Q for one stock reflects the contribution of every other stock the firm uses. Treating the slot's average Q as evidence of marginal q on the route currently flown overstates the slot's standalone return. Frontier's framework commits exactly this overstatement.

[4] Emphasis added

[5] The feeder value of London traffic is not site-specific to LHR. Most network value would remain portable to other London airports, as the 'access value' derives from the London market rather than the specific runway.

[6] Crouzet and Eberly, *Rents and Intangible Capital: A Q+ Framework*: with multiple capital types, average Q for one type reflects the value of other capital types used by the firm and can overstate its marginal q. Journal of Finance, 78(4), [Crouzet and Eberly, 2023, pp. 1875–1876, 1881].

Layer 2: The LRMC benchmark is the wrong regulatory yardstick

3.11 Even granting Frontier's stock-to-flow logic for the sake of argument, the LRMC benchmark itself is not the right reference point for a regulatory inference about extractable rent. LRMC, as Frontier defines it, comprises variable operational costs, the long-run cost of capacity (aircraft finance) and route-related overheads. It is the cost of providing the seat in a competitive market with free entry. It is not the airline's full economic cost.

3.12 A typical full-service carrier incurs material costs that LRMC, narrowly defined, excludes: head-office overhead, brand investment, technology infrastructure, loyalty programmes, distribution, and the cost of capital on enterprise assets that are not allocated to a single route. For major full-service carriers these categories together typically run to several percentage points of revenue. In a long-run competitive equilibrium, fares must clear all of these costs together with LRMC, or the airline does not earn its cost of capital and exits.

3.13 Therefore "fares > LRMC" does not equal "rent" in the regulatory sense. It is consistent with airlines clearing their full cost of capital, with airlines not clearing it, or with airlines earning above it. The operative test is whether airlines earn returns above WACC across the cycle, not whether fares exceed a narrow benchmark that omits much of what airlines actually spend.

3.14 On the operative test, Heathrow operators do not pass. Oliver Wyman's 2024 study reports a 9.7% blended EBIT margin across all Heathrow carriers. Table 2 of the IAG *Empirical Tests* paper places the cycle-average margin required to cover WACC at approximately 10.5%, given typical operating leverage and the cyclicality of airline returns (Virgin Atlantic and British Airways each produced operating margins worse than negative 30% in 2020 and 2021). A 9.7% blended margin in normal conditions is consistent with sub-economic returns over the cycle, not with the existence of a £2 billion annual rent on top.[International Airlines Group, 2026, p. 8]

3.15 The implication is that even if Frontier's framework correctly identified a fare-LRMC gap, that gap would not constitute a recoverable rent for regulatory purposes. The CAA's question is whether airlines earn returns above their cost of capital that could be redirected. The answer, on the audited record, is no.

Layer 3: The premium is empirically absent across all four observable channels

3.16 A test of any rent claim is whether the rent appears in observable data. A claim of a £3.5 billion annual premium, paid by passengers and collected by slot holders, must materialise in one of the four channels discussed previously. It does not.

The five calibration errors compound the conceptual ones

3.17 Even on its own framework, Frontier's calibration contains five identifiable methodological errors. Each independently inflates the inferred annual rent. Together they account for most of the residual gap between Frontier's £2 billion figure and the realised financial outcomes of the carriers operating at Heathrow.

3.18 **1. Sample size.** Frontier infers an airport-wide rent from a sample of public-knowledge slot transactions averaging 2.1 daily slot pairs per year over thirteen years, equivalent to approximately 0.3% of operating slots. Over 99% of slots in use are held under historic rights and were never subject to a market test. The traded sample is not representative of the holding base, and statistical inference from a sample of this size and selectivity is unsound.

3.19 **2. Sample exclusion.** Frontier excludes the 2012 IAG acquisition of bmi from its sample. That transaction is the largest single slot transfer in the public record (42 daily slot pairs after competition remedies, for a £172 million purchase price that included a loss-making airline). At that price point, the implied per-pair value is approximately £4 million, an order of magnitude below Frontier's headline calibration. Excluding the largest, lowest-per-unit transaction biases the calibration upwards.

3.20 **3. Asset life.** Frontier assumes a 10-year slot life. Heathrow slots are held indefinitely under the 80/20 use-it-or-lose-it rule, and over the last thirty years there is no material example of a slot being lost in this way by an airline that wished to retain it. The mathematical consequence of the 10-year assumption is significant. For a fixed observed slot price, the ratio of an n-year annuity premium to its perpetual baseline is:

$$\frac{C_n}{C_\infty} = \frac{1}{1 - (1 + r)^{-n}}$$

3.21 At Frontier's chosen WACC of $r = 7.5\%$ and $n = 10$, that factor is approximately 1.942. The 10-year truncation mechanically inflates the inferred annual rent by approximately 94% relative to a perpetual specification, before any other adjustment.[7]

3.22 **4. Permitted trading.** Frontier treats the absence of secondary slot prices at non-UK Level 3 hubs (Frankfurt, Paris CDG, Madrid, Amsterdam) as evidence that those airports lack scarcity. The inference is wrong. Secondary trading is not permitted at most major hubs globally due to regulatory choice. The value of access at those airports is capitalised in airline enterprise value rather than in a separately observable slot price. Frontier's framework misreads a regulatory artefact as an economic signal.

3.23 **5. Marginal-buyer pricing.** In a market where supply is fixed, the clearing price is set by the marginal buyer, the participant whose valuation of the next available unit is highest, not by the average holder's economics.[8] In a thin market for scarce assets, the marginal buyer may be willing to pay more than most

[7] Full derivation: if a slot is treated as a perpetual access right, consistent with the 80/20 'use it or lose it' grandfathering rule, its annual premium is derived as a perpetuity (C_∞). The ratio of an n-year annuity premium (C_n) to this perpetual baseline, given the same present value, is exactly $1/(1 - (1 + r)^{-n})$. At $r = 0.075$ and $n = 10$, this inflation factor is approximately 1.942. By truncating the holding period to 10 years, Frontier's method mechanically increases the required annual rent by over 94% before any adjustments for network or option value are considered.

[8] In a market where supply is fixed, the market price is set by the marginal buyer: the participant whose valuation of the next available unit is highest. In a thin market for scarce assets, this buyer may be willing to pay more than most incumbents could justify from their own operating returns, because the buyer can extract greater value from the asset within a different network, strategy or financial structure. The observed price reflects the ceiling of willingness to pay, not the floor of operating performance.

incumbents could justify from their own operating returns, because the marginal buyer can extract greater value from the asset within a different network, strategy or financial structure. Frontier's average price per slot, calculated from a small sample dominated by high-value peak-time long-haul transactions, does not represent the average value across the holding base.

Four theoretical frames Frontier ignores

3.24 The errors above are predictable consequences of treating a fixed-supply, network-complementary, optionable access right as if it were a standard operating asset. Four bodies of theory address this directly.

3.25 **Ricardian rent.** In Ricardo's framework, scarcity rent is price-determined, not the operator's excess profit (David Ricardo, *Principles of Political Economy and Taxation*, 1817). The most productive land commands a higher rent because the marginal land cleared for cultivation produces less. Applied to slots: a marginal-quality slot may not earn sufficient positive cash flows to pay for the full cost of the aircraft, while a peak-time slot earns significant positive cash flows to cover the difference in the same day. While there may be demand for more peak time slots, for many carriers at Heathrow the aircraft cannot only be used on just the peak-time slots. The capitalisation of that peak-time slot does not mean the holder earns supernormal returns on the activity flown from that slot. It means the asset itself has scarcity value, separate from operating performance, and crucially separate from any uniform theoretical fare premium charged across the airport.

3.26 **Asset pricing with real options.** Modern asset-pricing theory recognises that capitalised values reflect multiple contingent benefit streams, including options that may or may not be exercised in any given period. Slot value capitalises the option to redeploy across routes, gauges and time-of-day uses. That option has positive value whether or not it is exercised, and its value is reflected in the slot price even when current operating returns are normal or sub-normal. Treating capitalised option value as evidence of realised operating premium is a textbook category error in the asset-pricing literature.

3.27 **Network economics.** Hub-and-spoke profit functions are supermodular: the marginal profit of a spoke route depends on the existence of other spoke routes that share the hub's connecting traffic. Aguirregabiria and Ho show that airlines may rationally operate spoke routes at standalone losses when those routes generate complementary profit elsewhere in the network.[Aguirregabiria and Ho, 2012, pp. 1–2] A slot used for a loss-making short-haul route can therefore be valuable to the holding airline because of what it contributes to the rest of the system. That value capitalises into the slot price. It does not appear as supernormal margin on the spoke route Frontier observes, and it has nothing to do with a passenger-paid fare premium.

3.28 **Marginal-buyer pricing in thin markets.** Empirical evidence from comparable thin-market access regimes confirms the marginal-buyer dynamic. In California water markets, less than 5% of surface water trades annually, with wide price dispersion that does not map onto operating returns of average users.[Ferguson, 2024, pp. 2-3] Multi-species fisheries quota markets show similar thinness and price dispersion.[NOAA, 2024, pp. 1, 11, 37–38] Canadian dairy quota trades at C$24,000 to C$56,495 per kg of butterfat per day, in a market where the underlying farm operating returns are administratively managed and do not approach the implied rent.[Agriculture and Agri-Food Canada, 2025, p. 1] [Mussel, Al and Seguin, Bob and Sweetland,; Janalee, 2013, p. 1] In each case, the asset price reflects scarcity, regulatory regime and marginal-buyer dynamics, not a uniform user-paid premium.

Policy implication

3.29 The regulatory consequence of accepting Frontier's framework is that the CAA would underwrite expansion costs against a fare premium that does not exist in audited carrier accounts, in route-level fare comparisons, in cost analysis, or in load-factor data. The arithmetic mistake propagates through the regulatory policy in two channels.

3.30 On the cost-absorption claim, Frontier's framework treats the inferred premium as a buffer against materially higher airport charges. There is no such buffer to absorb. For long-haul operations near the cost of capital, a charge increase primarily reduces slot capital values without changing operating behaviour. For short-haul operations already at 2.3% EBIT margins, it eliminates the residual and pushes activity into negative economic profit, with consequent rationalisation, redeployment to lower-cost London airports, or exit.

3.31 On the consumer-benefit claim, Frontier's framework treats the premium as a mark-up that expansion will erode. The premium is not seen fares of close substitutes; eroding a non-existent fare premium does not lower fares. Adding capacity at a £49 billion capital cost loaded into the regulated asset base raises charges by more than enough to offset any erosion of theoretical scarcity value. The net effect on fares is that they would have to go up – and if the demand wasn't there, then the capacity would be pulled and fares would need to increase more to cover the airport charge increases.

3.32 The further policy intuition that the burden could be skewed onto long-haul rather than short-haul is also unavailable: at a 10.9% long-haul margin, only fractionally above the 10.5% cost-of-capital threshold, there is no long-haul rent cushion either. The consequence of skewing is to push long-haul into the same redeployment dynamic that already characterises short-haul, with foreign carriers having alternative hubs and BA and Virgin Atlantic having greater home-base constraints.

4 What we ask of the CAA

4.1 This submission has set out why Frontier Economics' £3.5 billion "congestion premium" figure does not measure a passenger-paid fare premium and should not be relied upon for regulatory policy decisions for Heathrow expansion or regulatory price controls. The corresponding asks fall into four categories.

4.2 **On the Frontier figure itself.** The CAA should reject the 2019 £2 billion figure as evidence of either airline profitability or a passenger-paid fare premium and support of their econometricly derived values. It is a capitalised asset-value calculation derived from a thin transaction sample, calibrated on a 10-year asset-life assumption that mechanically inflates the inferred annual rent by approximately 94%, excluding the largest and lowest-per-unit transaction in the public record, and resting on the assumption that the entire slot price represents the present value of a single value stream (a route-level fare premium) when slot prices in fact capitalise a bundle of value drivers. Treated as a measurement of recoverable rent, the figure cannot be triangulated against any of the four observable channels in which a passenger-paid premium would have to appear.

4.3 **On Affordability.** The CAA should test charging assumptions against the realised commercial behaviour of Heathrow operators: the documented commercial failure of bmi and Little Red, the two-decade rationalisation of European short-haul activity, like-for-like fare comparisons with Gatwick that show no Heathrow premium, and the published accounts of the largest carriers at the airport. That behaviour and that data are consistent with an absent fare premium and with normal-to-sub-normal carrier returns. Higher charges will not be absorbed; they will be reflected in fares, returns, route cuts and exits.

4.4 **On the capital envelope.** The CAA should require Heathrow Airport Limited to demonstrate that its proposed £49 billion capital envelope is consistent with the actual operating economics of its airline customers, and that the resulting charge increases can be supported without triggering material redeployment of short-haul capacity to Gatwick, Stansted and Luton. On the current evidence, that test is not met.

4.5 **On regulatory architecture.** The CAA should pursue regulatory reform that introduces competition for cost discipline, contestability and risk-sharing into the delivery of expansion. Expansion at any reasonable scale requires a smaller capital envelope and a regulatory framework that allocates risk appropriately between the airport and its airline customers. Without both, no allocation of charges produces a stable commercial outcome, and the connectivity that makes Heathrow valuable is the variable that adjusts.

4.6 The slot value question is therefore not a detail of methodology. It is the foundation on which a multi-decade infrastructure decision is being built. If the foundation is a fare premium that has never been observed in any of the channels it would have to flow through, the building will not stand.

4.7 IAG supports expansion at Heathrow. It does not support expansion at any cost. The difference between the two positions is whether the regulatory policy is built on slot prices that have been mistaken for a fare premium, or on the actual fares passengers pay, the actual returns airlines earn, and the actual operating economics of the carriers that will fund the expansion and fly the passengers it is meant to serve.

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