CALYPSO COMMODITIES

X-LNG CASE STUDY · JUL 2025

Valuing Indexation Flexibilities

$0.52

mean value per MMBtu of a per-cargo Brent-or-HH choice against a Brent-locked book; $0.42 against HH

Calibrated at the money · intrinsic ≈ $361k **1,000 MC paths** · re-optimised per path **12 monthly cargoes** · US FOB into German TTF demand

Three books, one difference

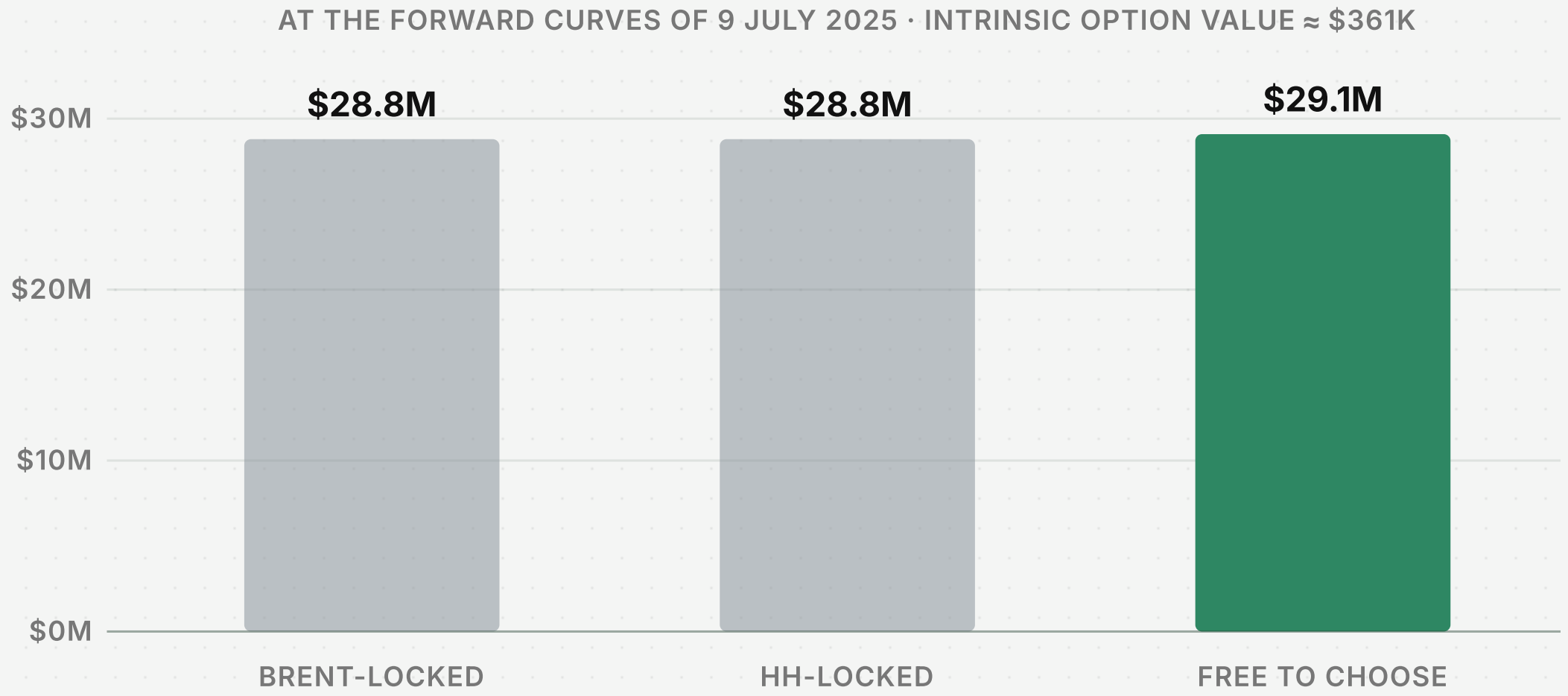
Twelve monthly US FOB cargoes into a TTF-indexed German demand leg · one 174k vessel

1	2	3	0
benchmark: every cargo Brent-locked	benchmark: every cargo HH-locked	flex book: the buyer chooses per cargo	other differences: same cargoes, same windows

The two formulas are deliberately calibrated so both benchmarks earn the same at the forward curves of 9 July 2025: **the option starts almost exactly at the money.** Everything the analysis finds is pure extrinsic value.

At the curve, the option looks worthless

Portfolio profit at forwards: the free choice adds one cent per MMBtu



EXACT: $28.8M / $28.8M / $29.1M · INTRINSIC VALUE ≈ $361K · $0.01/MMBTU

A forward-curve valuation would conclude the clause is not worth negotiating. That conclusion is what the rest of the study dismantles.

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01

The zones

Both indices scaled -50% to +50%: where the choice switches on

Locked books see one axis, the flex book sees two

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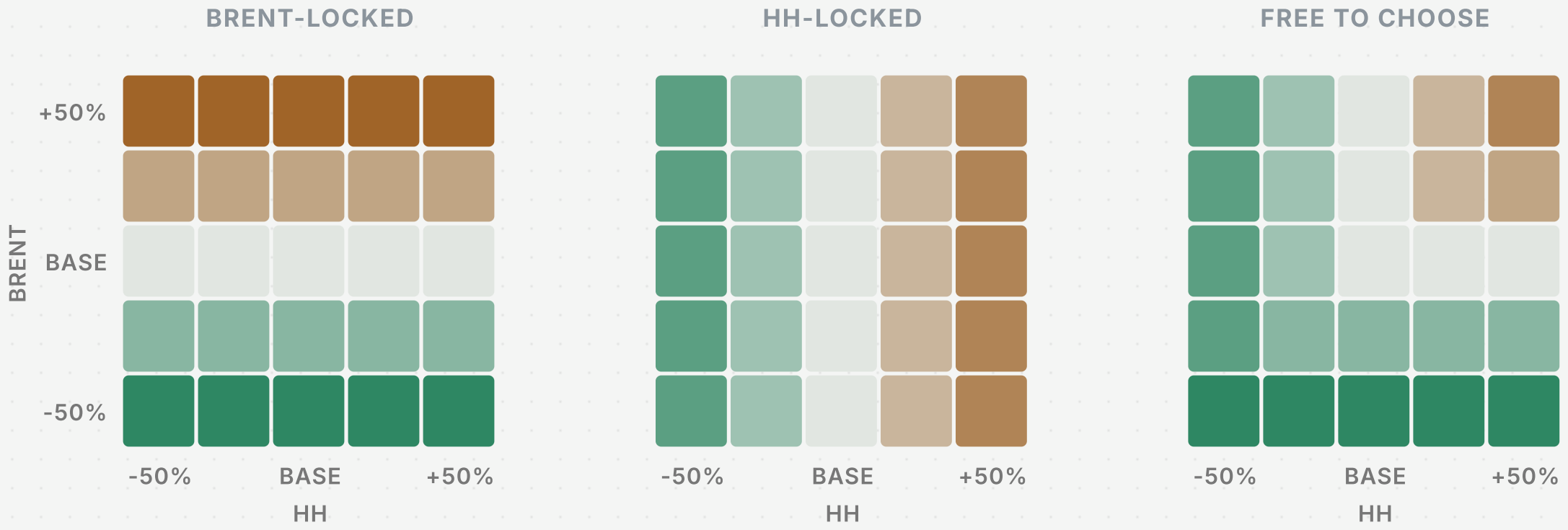
Profit per MMBtu across the same sweep, per book

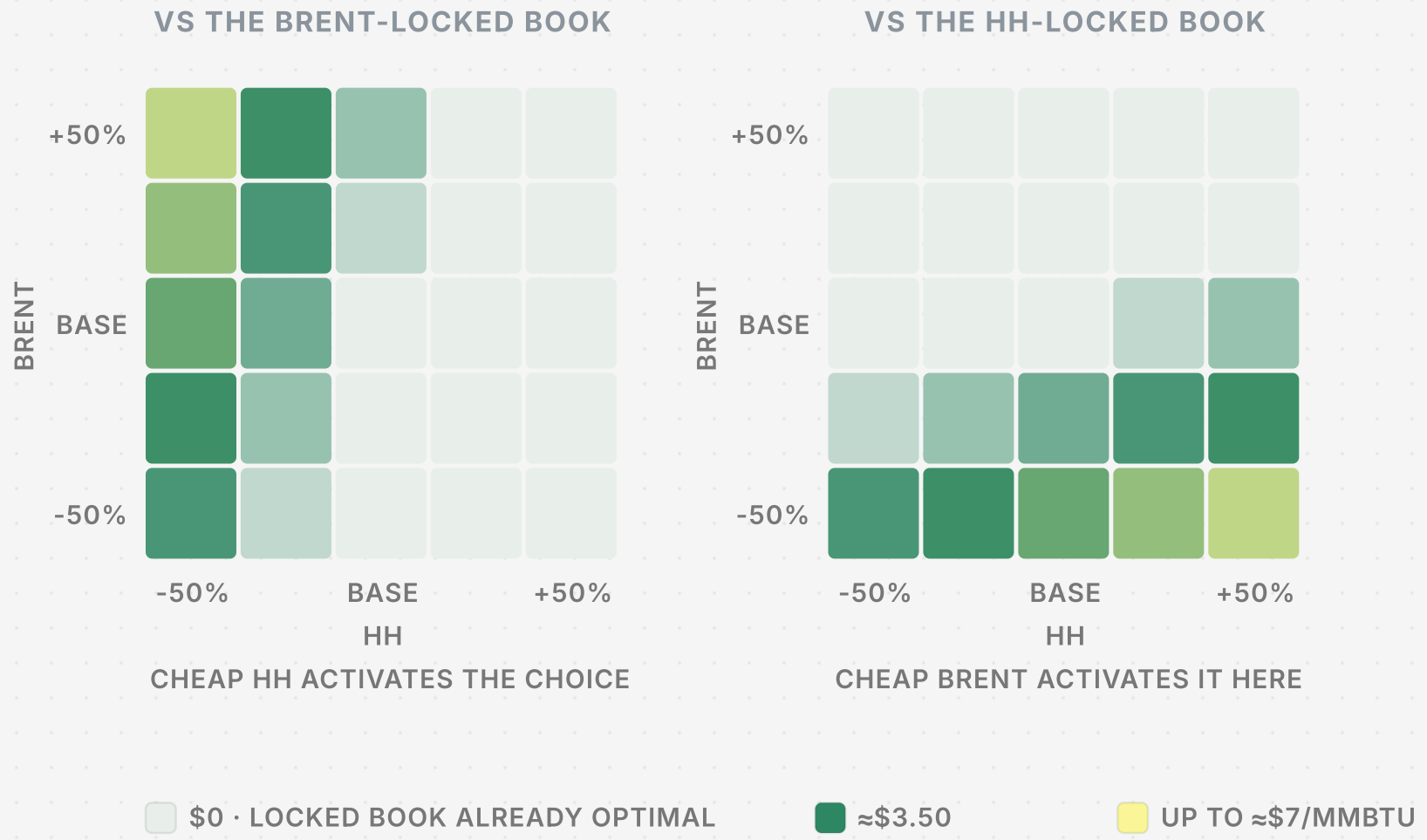


REBUILT FROM THE ENGINE SURFACES · CELL COLOURS QUALITATIVE

Each benchmark responds only to its own index; the flex book takes the best of both, which is where the option value comes from.

Where the choice switches on

Activation zones of the index option against each locked benchmark



CELL COLOURS QUALITATIVE, ANCHORS FROM THE ENGINE SURFACES · UP TO ≈$7/MMBTU

Cheap HH activates the choice against the Brent-locked book; cheap Brent against the HH-locked one. In the zero regions the locked book already holds the optimal index.

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02

The simulation

1,000 realistic price paths, all three books re-optimised on every path

Simulation moves the whole book right

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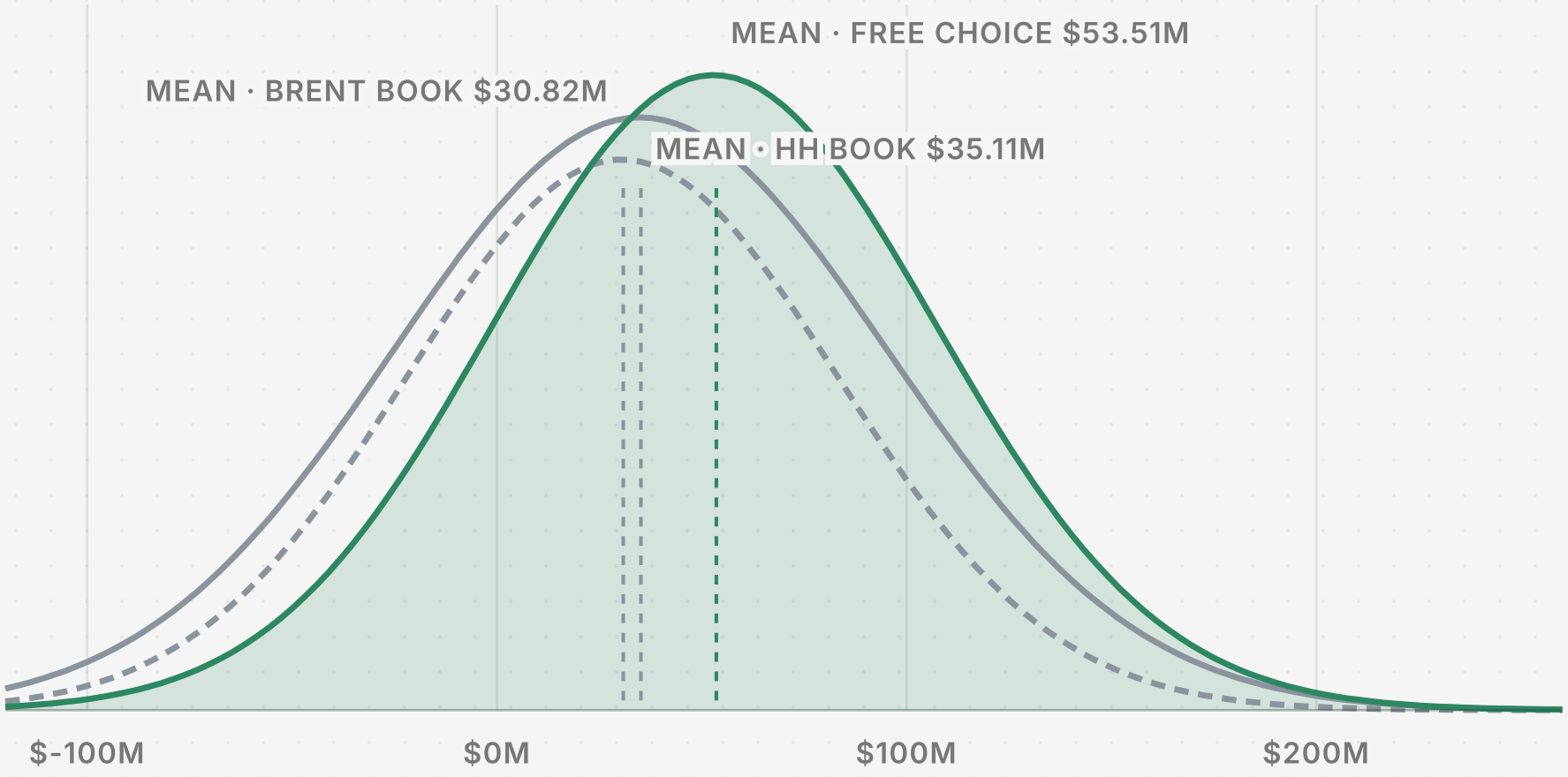
MC profit distributions of the three books



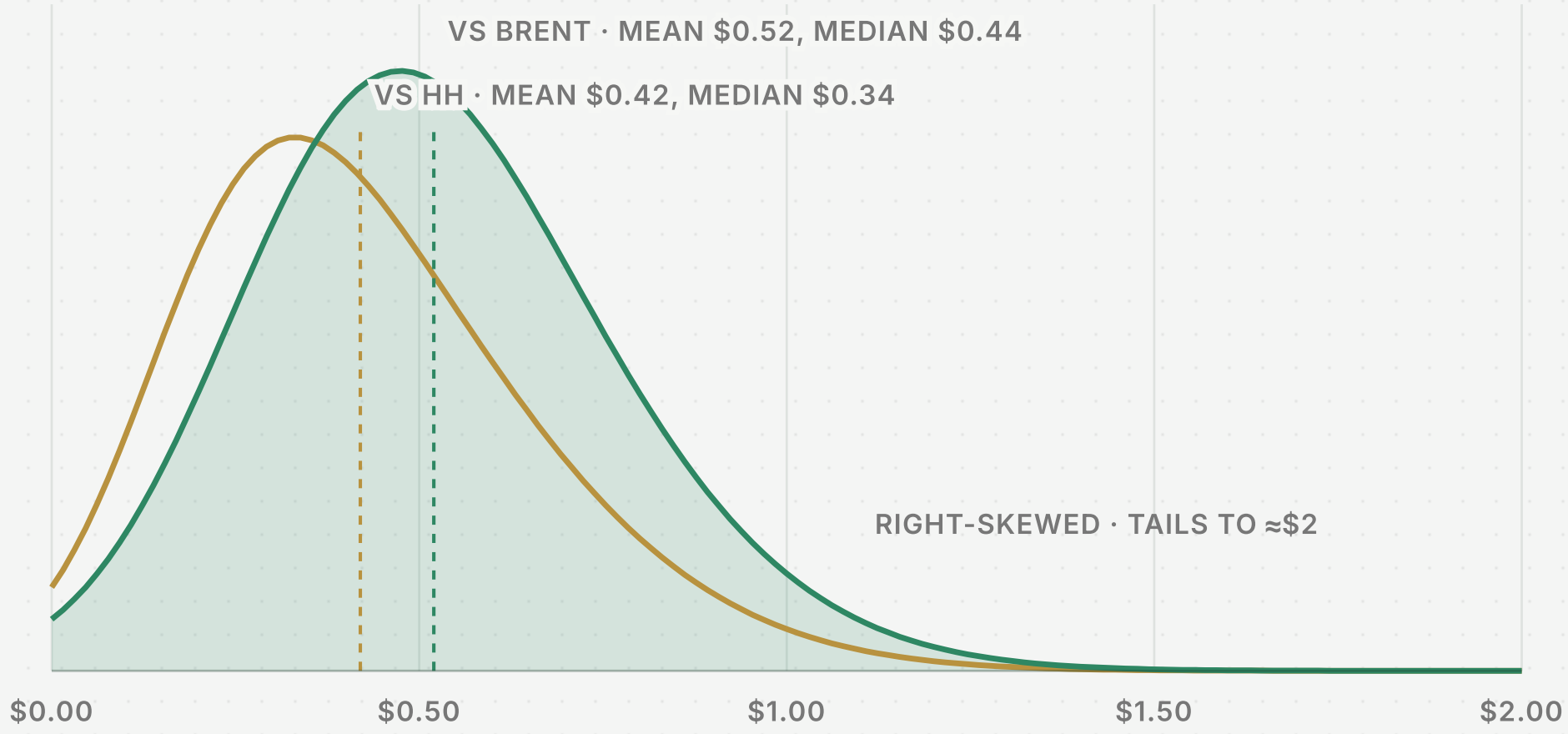
1,000 MC PATHS, RE-OPTIMISED PER PATH · SHAPES ILLUSTRATIVE, MEANS EXACT

EXACT MEANS: $30.82M / $35.11M / $53.51M · MEDIANS $28.13M / $34.80M / $51.98M

The benchmarks differ because the indices have different volatility profiles; the flex book beats both by capturing whichever moves favourably.

The option, priced path by path

Per-path difference between the flex book and each benchmark



VALUE OF THE INDEX CHOICE PER PATH · $/MMBTU · CURVE SHAPES ILLUSTRATIVE, ANCHORS EXACT

EXACT ANCHORS: $0.52 MEAN / $0.44 MEDIAN VS BRENT · $0.42 / $0.34 VS HH

Right-skewed with tails to about $2/MMBtu and no meaningful downside: the choice can be ignored, never regretted.

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THE VERDICT

Forwards price the index choice at one cent per MMBtu: simulation prices it at fifty-two.

Extrinsic value lives exactly where forward-curve valuations cannot see. Whoever prices indexation clauses by simulation knows what to pay for them, and what to charge.

Takeaways

What the index choice is really worth

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✓ **Calibrated at the money, still worth $0.52**

Intrinsic value is a rounding error of $361k; the $0.52/MMBtu vs Brent and $0.42 vs HH are pure extrinsic value.

✓ **The choice pays against both benchmarks**

$53.51M mean for the flex book against $30.82M (Brent) and $35.11M (HH); higher vs Brent because cheap-HH conditions occur more often.

! **Asymmetric upside, no downside**

Both distributions are right-skewed with tails to about $2/MMBtu; the option can be ignored, never regretted. Illustrative calibration.

Modelled with X-LNG

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Whole-portfolio optimisation for LNG books

1

Your world goes in

Contracts, vessels, charter rates, prices, spot assumptions and constraints, the full book, not a slice.

2

One optimal plan comes out

Feasible, P&L-maximising and constraint-compliant, re-solved for every scenario in minutes.

3

Every number checks out

Each result can be recalculated by hand, transparency your risk committee can audit.

Cloud-based, any portfolio size · built and advanced daily by ~25 mathematicians, physicists and computer scientists.

Price the clauses before you concede them

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