What would our liquidity providers have earned?

WINDOW	POOL SIZE	VOLUME ASSUMED
August 2021 to July 2026 1,801 days, 60 complete epochs	**$2,500,000 per pool** 50% underlying, 25% each smart token	**4% of the pool a day** full range 0.5% to 20% shown

+7.4% a year

BTC pool LP at 4% daily turnover. Holding BTC alone would have returned +5.3%.

−21.8% a year

ETH pool LP at 4% daily turnover. Holding ETH alone would have returned −10.4%.

In short

At 4% of the pool traded a day, a level in line with pools like ours, the BTC pool would have paid its liquidity providers 7.4% a year, 2.1 points more than holding BTC; below about 3% a day of trading volume it would have trailed BTC. At the same 4% the ETH pool would have lost 21.8% a year, about twice the loss of holding ETH, and almost all of that comes from one event, the knock-out of June 2022, which section 08 explains. Trading volume is the one unknown, so the result is shown as a curve across volumes; 4% is a working assumption, not a finding.

01 What is being simulated

Each pool is given $2.5M of liquidity in August 2021, half in the underlying and a quarter in each smart token, which at an epoch start is an equal number of all three, and left to trade until July 2026. The question is what that liquidity earned per year. Every provider owns a share of the same pool, so the answer is the same for a $10,000 position as for the whole $2.5M.

The pools did not exist during those years, so the answer has to be simulated. Everything needed is known except one thing: how much ordinary trading the pools would have attracted, and the study treats that as a dial rather than a guess.

02 Two ideas the rest of the study relies on

Arbitrage and LVR	The pool is like a shop whose price list only changes when someone trades. Say it lists RiskON at $100 and the market moves to $104 while nobody trades. The first trader to notice buys RiskON from the shop at $100 and sells it elsewhere at $104. Had the market moved to $96 instead, the trader would have sold RiskON to the shop at $100. Either way the trader gains about $4 a token and the pool loses it, because nobody trades on a stale price unless it favours them. The pool's fee is its charge for this. Say the fee that hour is 1% (it moves between 0.4% and 1.5% with volatility): the trader pays $1 on the $100 trade, keeps $3 of the $4 gap, and the pool keeps $1. Over thousands of moves this is a real, steady loss for the liquidity, and every pool that quotes from its balances pays it, Uniswap, Balancer and Curve included. In the BTC pool it came to about $0.6M over five years at 4% turnover, against $0.3M of fees from those same trades. The literature calls it loss versus rebalancing, LVR.
Rebalancing premium	The same trades also help the pool when prices go up and down. When a token rises, traders buy it from the pool until the pool's price catches up, so the pool has sold some of it high. When it falls, traders sell it to the pool, so the pool has bought low. Over a round trip the pool ends slightly ahead of someone who just held. Example with $100 of a token and $100 of cash: the token doubles and the pool sells $50 of it to get back to half and half; the token then halves back to where it started, and the pool holds $75 of token plus $150 of cash, $225 against $200 for a holder. Small moves do the same thing thousands of times. In a one-way fall there is no rebound: the pool keeps buying the falling token all the way down, which is what happened in June 2022. Because the rebalancing happens at the pool's stale prices, the pool earns the premium and pays the LVR on the same trades. In the BTC pool the two nearly cancelled, about $0.5M against $0.6M, so what the liquidity kept was essentially the fees minus the AUM fee.

03 How the simulation works, in five steps

1

Rebuild the past

Real minute prices, the live fee formula and the risk engine's own values for RiskON and RiskOFF.

Gives fees and fair values for every hour

2

Work out the arbitrage

Every profitable trade against fair value, each hour, with its fee and its loss both recorded.

Gives arbitrage fees and LVR

3

Set the trading volume

Ten volume levels from 0.5% to 20% a day, with 4% marked as the working assumption.

Gives ordinary fees at each volume level

4

Walk five years

Hour by hour for 1,801 days, through every epoch, the AUM fee and the June 2022 knock-out.

Gives daily books that close to the cent

5

Add everything up

Fees earned, minus losses and the AUM fee, plus the market's move, against simply holding.

Gives return per year, as a curve

Step 1: rebuild the past. Prices come from Coin Metrics at one price per minute, the same feed the risk engine uses; the LP fee is recomputed from them with the live formula; the hourly values of RiskON and RiskOFF, the epoch calendar and the knock-out come from the risk engine's own records. Nothing in this layer is assumed.

Step 2: work out the arbitrage. Between trades the pool's quotes stand still while fair values move, so gaps open. Whenever a gap grows larger than the fees, the simulation lets a trader close it: every hour it finds the most profitable trade against fair value across the three token pairs, executes it, and repeats until none is left. Each trade pays the pool a fee and, because the pool was quoting a stale price, takes a little value out of it, as in the $100 and $104 example in section 02. Both are recorded, so the arbitrage fees and the LVR come out of the simulation rather than being assumed.

Step 3: set the trading volume. Volume here means all trading, arbitrage plus ordinary, as a share of the pool's value: at 4% a day a $2.5M pool sees about $100,000 of trades a day. The ordinary part, trades from ordinary users, cannot be read from history for a pool that did not exist, so the whole simulation is run at ten volume levels, from 0.5% to 20% a day, and the result is shown as a curve. Ordinary flow is whatever is left after the arbitrage already worked out; it is assumed to come from both sides equally, to rise on volatile days (with the square root of volatility, which is what exchange data shows), and to be a little noisy from day to day.

Step 4: walk five years. The pool is walked forward hour by hour for 1,801 days. Each hour the new fair values arrive, the arbitrage runs at that hour's fee, and the fee income and losses are booked. At each epoch boundary in the engine's calendar the pool is re-pegged the way the contract does it at a rebase, with no fee and no loss. The 2% a year AUM fee is taken every day, at 2% divided by 365, on the pool's RiskON and RiskOFF balances: about $68 a day on a $2.5M pool with half its value in the smart tokens. The June 2022 knock-out is settled the way the engine settled it, which section 08 explains.

Step 5: add everything up. The result is the return per year on the liquidity: fees earned, minus what arbitrage took, minus the AUM fee, plus or minus what the tokens themselves did, all as a change in what the position is worth. It is not the fee yield DEX front-ends show, which divides fees by pool size and ignores the rest: a pool that earns 12% in fees while its tokens fall 20% has a return near minus 10%, not plus 12%. The return is shown against simply holding the underlying.

04 What this study does not cover

Volume on volatile days. Volume usually rises on volatile days: over the study window the most volatile tenth of days carried 1.6 to 1.9 times a typical day's volume on centralised spot exchanges and on Uniswap alike, and the model lets ordinary flow rise the same way. It assumes traders are not put off by the higher fee those days carry; if they were, income on those days would be a little lower.

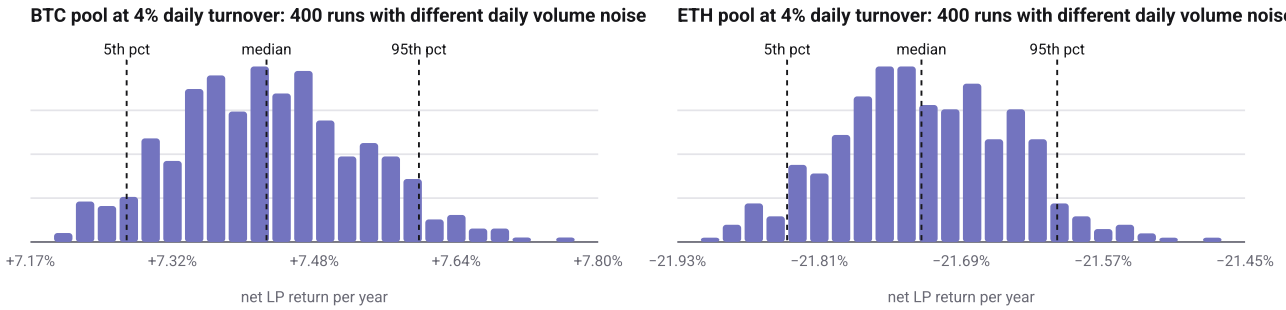
Deposit timing. The liquidity is placed on the first day and never touched; entering later, leaving earlier or stepping out ahead of the knock-out would change the result.

Incentives and gas. No points, rewards or transaction costs are included; the study measures the pool's own economics only.

05 The Monte Carlo layer

Most of the simulation is deterministic: one price history, one fee history and one epoch calendar, so running it twice gives the same answer. The one random input is how much ordinary trading arrives on any given day. A Monte Carlo simulation handles that by running the same five years many times with a different random pattern of daily volume each time, and looking at the spread of results.

For each volume level the simulation creates 400 different five-year sequences of daily volume noise. Each day's target volume is multiplied by a random factor that averages one but varies from day to day, with a spread of about 42%: on one day the pool might see 0.6 times its target, on the next 1.5 times. The arbitrage volume already worked out is subtracted, what is left is the ordinary flow for that day, and its fees are added to the pool. Each of the 400 sequences produces its own five-year return, and the band around the curve in section 06 is the range between the 5th and the 95th of them.



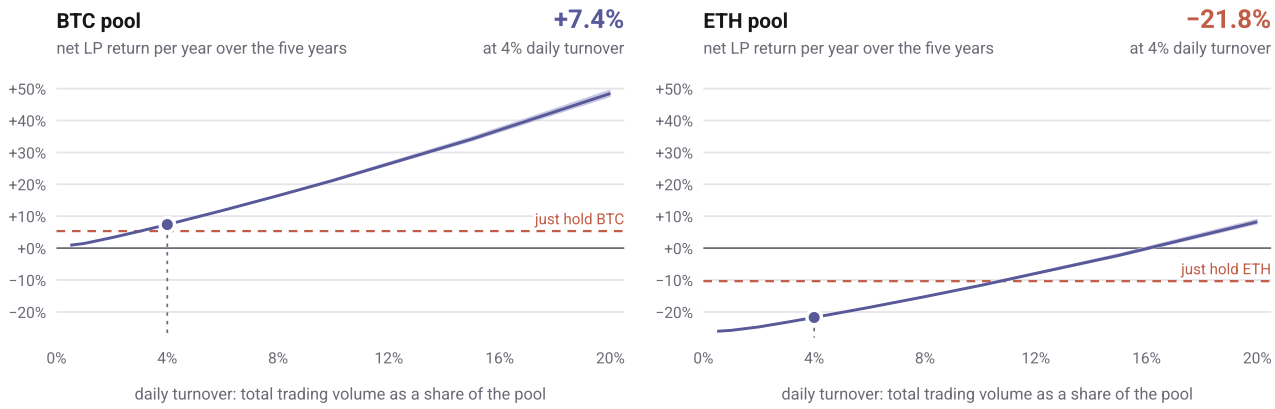
The 400 five-year returns at 4% daily turnover, with the 5th percentile, the median and the 95th percentile marked. The whole spread is about 0.3 points of return for BTC and 0.2 points for ETH: the day-to-day luck of trading volume barely matters, because 1,801 days of independent noise average out. The spread widens to about 2.4 points at 20% a day.

The spread at every volume level

	BTC pool, return per year across the 400 runs			ETH pool, return per year across the 400 runs		
Daily turnover	**Low (5th pct)**	**Median**	**High (95th pct)**	**Low (5th pct)**	**Median**	**High (95th pct)**
0.5%	+0.9%	**+0.9%**	+0.9%	−26.1%	**−26.1%**	−26.1%
1%	+1.5%	**+1.5%**	+1.6%	−25.8%	**−25.7%**	−25.7%
2%	+3.2%	**+3.3%**	+3.4%	−24.7%	**−24.6%**	−24.6%
3%	+5.2%	**+5.3%**	+5.4%	−23.3%	**−23.2%**	−23.1%
4%	**+7.3%**	**+7.4%**	**+7.6%**	**−21.8%**	**−21.7%**	**−21.6%**
6%	+11.6%	**+11.8%**	+12.1%	−18.7%	**−18.5%**	−18.4%
8%	+16.1%	**+16.4%**	+16.8%	−15.5%	**−15.2%**	−14.9%
10%	+20.8%	**+21.2%**	+21.8%	−12.0%	**−11.7%**	−11.3%
15%	+33.4%	**+34.2%**	+35.0%	−2.8%	**−2.2%**	−1.6%
20%	+47.4%	**+48.5%**	+49.8%	+7.4%	**+8.3%**	+9.2%

06 The result: return as a curve over trading volume

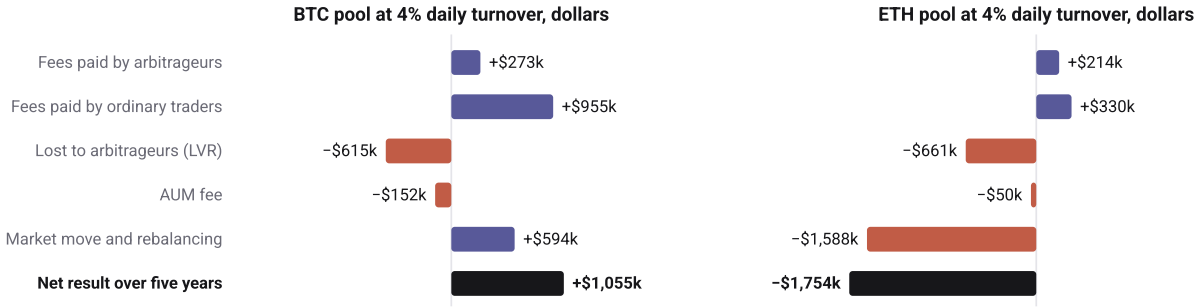
Because trading volume is the one unknown, the result is a curve rather than a single number: each point is a full five-year simulation at that daily volume. The dot marks 4%, and the dashed line shows what the same money would have made if simply held in the underlying. The light band around each line is the spread of the 400 Monte Carlo runs from section 05, from the 5th to the 95th percentile; it is barely wider than the line at low volumes and widens at high volumes, because the more ordinary volume there is, the more its day-to-day luck matters.



Net return per year on the liquidity at each level of daily trading volume, after fees earned, arbitrage losses, the AUM fee and the market's own moves. At 4% a day the $2.5M became $3,555,443 in the BTC pool and $745,823 in the ETH pool.

07 Where every dollar went

The five-year result at 4% daily turnover, split into its parts: bars to the right added money, bars to the left took it out, and the bottom bar is the sum.



Fees paid by arbitrageurs and **fees paid by ordinary traders** are the pool's income. The first comes from the trades worked out in step 2; the second depends on the volume dial, and at 4% a day it is the larger of the two.

Lost to arbitrageurs is the LVR: what the pool gave away by quoting stale prices, as in the example in section 02. In both pools it is larger than the fees those same arbitrageurs paid, which is normal for a pool with fees at this level; what the pool earns on top has to come from ordinary traders.

Market move and rebalancing is what the tokens the pool held did over the five years, including the rebalancing premium from section 02. For BTC it was strongly positive: five choppy years of sideways and up are full of the round trips the premium feeds on. For ETH it is the largest bar on the page and it is negative, and section 08 is about why.

Two volume levels worth remembering. For the BTC pool, fees cover the arbitrage loss and the AUM fee from about 2.4% daily turnover, and providing liquidity beats simply holding BTC from about 3.0% a day. For the ETH pool, fees cover the costs only from about 5.4% a day, and providing liquidity beats holding ETH only above about 10.8% a day, well above the 4% assumption.

08 The ETH knock-out, explained

What happened. The epoch that began in May 2022 started with ETH at $2,018, so the barrier sat at $958. Over the next four weeks ETH fell by more than half and, in June 2022, crossed it. The engine's records show the epoch knocked out and a fresh one starting straight away with ETH at $937. It is the only knock-out in the five-year window.

Why the pool lost more than a holder of ETH. The pool is passive: it quotes prices from its balances and fills whatever trade arrives at those prices. As RiskON's fair value fell hour after hour, the pool's quote lagged above it, so traders kept selling RiskON to the pool at the stale, higher price until the quote caught up, and each time the pool was left holding more RiskON at a lower price. Over the four-week slide the pool absorbed more and more RiskON on the way down, and when the barrier hit, all of it was settled at close to nothing. That one epoch took the pool from $1,470,429 to $406,158, a fall of 72.4%, while ETH itself fell 43.1% over the same days.

How the knock-out was settled. At the barrier, the $958 that one ETH was worth is split between the two tokens: RiskOFF gets half of the barrier plus 46.5% of the epoch's start price, and RiskON gets half of the barrier minus that. That is $948 to RiskOFF and $10 to RiskON, about one percent of the pot. RiskOFF had started the epoch at $1,009, half the underlying, so the knock-out cost it 6.0%, a point more than the 5% floor it has in an epoch that runs to term.



The gap that opens in June is the pool absorbing RiskON on the way down. After the knock-out the pool restarts from a much smaller base.

What it means. Almost all of the gap between the two pools is this one epoch. Set those 30 days aside for both pools and the ETH pool would have earned 3.8% a year against 3.5% for holding ETH, while the BTC pool made 19.5% against 15.8% for holding BTC.