THE INFRASTRUCTURE TAX: 17 MONTHS OF VIRTUAL SWAPS ANALYSED

How TWAP execution transforms the economics of large VIRTUAL swaps — the reserve currency of Virtuals Protocol's 30,000+ AI agent ecosystem

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40.9M	312,075	100%	~$93M	$13,661
on-chain txns scanned	clean human trades	TWAP win rate · 145 wks	total left on table	median gain on $50K sell

312,075
40.9M raw → filtered
Clean VIRTUAL swaps

~$93M
$987.5M volume analysed
Total left on table

100%
145/145 weeks
TWAP win rate (24h)

+85.6%
$100K order, 24h TWAP
Max median improvement

This report analyses 17 months of historical VIRTUAL swap data from Uniswap V3 and Aerodrome on Base — the five deepest VIRTUAL liquidity pools — to quantify the price impact cost of large instant swaps and the improvement achievable through TWAP execution. VIRTUAL is unique: as the reserve currency for 30,000+ AI agent tokens on Virtuals Protocol, its pools experience constant multi-hop flow that makes instant-swap timing a lottery.

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1. Executive Summary

VIRTUAL is not an ordinary token. As the reserve currency of Virtuals Protocol — a platform hosting over 30,000 AI agent tokens on Base — VIRTUAL pools experience a form of continuous multi-hop pressure that no other single-chain token matches. Every AI agent launch, every WETH→VIRTUAL→AI_TOKEN swap, every rebalancing event flows through VIRTUAL liquidity. The result: pools that are constantly perturbed, partially recovered, and perturbed again — making instant-swap timing unpredictable and TWAP execution particularly valuable.

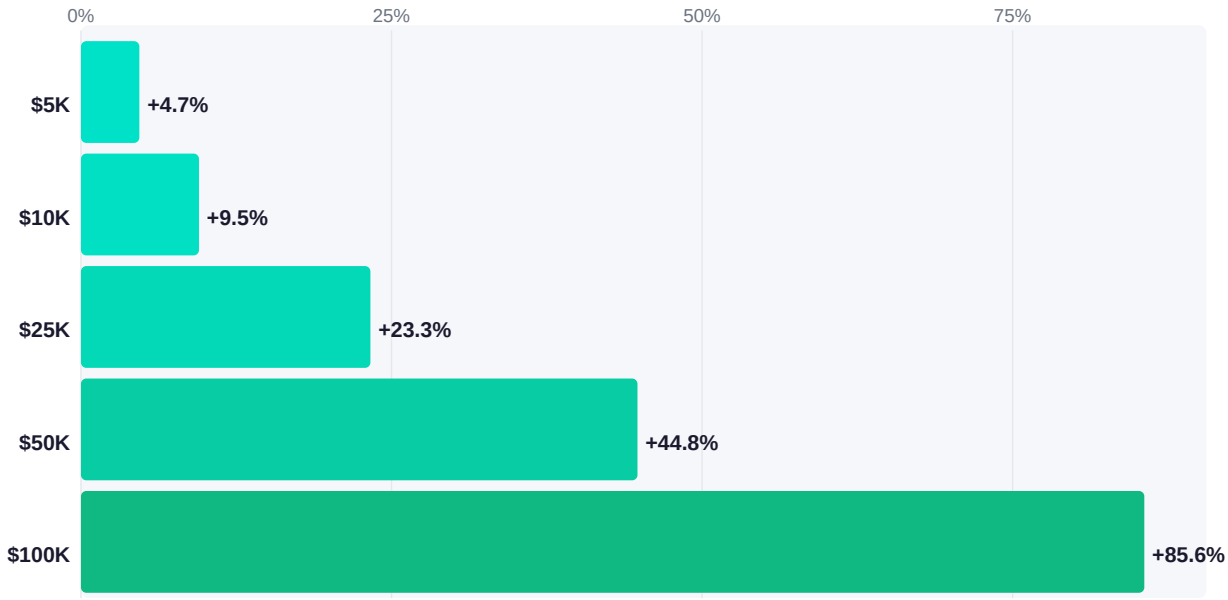
We analysed 40,906,680 on-chain transactions across five VIRTUAL pools on Uniswap V3 and Aerodrome, covering October 2024 through March 2026. After removing 91.9% of rows as bot and MEV activity, we ran 2,175 simulations across 145 weekly periods, five order sizes, and three TWAP durations.

Key finding: A $100,000 VIRTUAL sell executed as a single instant swap returns a median of $43,937. The same order via Slicr TWAP (24h, 10 slices) returns $81,548 — a difference of +$37,611 (+85.6%). TWAP outperformed instant swap in 100% of 145 weekly simulations across all order sizes tested.

Cumulative finding: Across all 312,075 clean swaps and $987.5M in VIRTUAL trading volume since launch, we estimate **~$93M in execution value was left on the table** by traders using instant swaps. Every dollar of that gap was theoretically capturable through TWAP execution — at a fee cost of 30 bps.

Order Size	Instant Output	TWAP Output (24h)	Improvement	Win Rate
$5,000	$4,700	$4,920	4.7% ($220)	100%
$10,000	$8,868	$9,711	9.5% ($843)	100%
$25,000	$18,954	$23,376	23.3% ($4,422)	100%
$50,000	$30,525	$44,186	44.8% ($13,661)	100%
$100,000	$43,937	$81,548	85.6% ($37,611)	100%

Median values across 145 weekly simulations (72 Aerodrome + 73 Uniswap V3). 24h TWAP, 10 slices. All TWAP outputs are net of the 30 bps Slicr fee.


0%
25%
50%
75%
$5K
+4.7%
$10K
+9.5%
$25K
+23.3%
$50K
+44.8%
$100K
+85.6%

2. Dataset & Methodology

2.1 Data Collection

Transaction data was fetched via the Uniswap V3 subgraph (The Graph, Base mainnet) and the Aerodrome subgraph for all five active VIRTUAL/WETH pools. The dataset spans 40,906,680 on-chain transactions: 27,803,010 from two Aerodrome pools and 13,103,670 from three Uniswap V3 pools. Pre-filtering at the data collection layer removed transactions below $1,000 to keep dataset sizes manageable — the API still paged through all 40.9M on-chain records.

Pool ID	DEX	Pair	Fee	Txns	Date Range
aerodrome_0	Aerodrome	VIRTUAL/WETH	0.05%	12,572,313	Oct 2024 – Mar 2026
aerodrome_1	Aerodrome	VIRTUAL/WETH	0.3%	15,230,697	Oct 2024 – Mar 2026
uniswap_0	Uniswap V3	VIRTUAL/WETH	0.05%	10,778,476	Apr 2024 – Mar 2026
uniswap_1	Uniswap V3	VIRTUAL/WETH	0.3%	1,875,387	Apr 2024 – Mar 2026
uniswap_2	Uniswap V3	VIRTUAL/WETH	1%	449,807	Apr 2024 – Mar 2026

2.2 Bot & MEV Filter Pipeline

Nine sequential filters removed 91.9% of input rows, isolating 312,075 genuine human swaps. Filter F4 (high-frequency ≥3 swaps/hour) dominates removal on both venues, consistent with heavy MEV bot activity driven by VIRTUAL's role in 30,000+ AI agent token pairs. The resulting dataset is conservative — some legitimate large trades may be excluded, meaning TWAP improvement estimates are understated.

Filter	Aerodrome Removed	Uniswap V3 Removed	Combined	Rationale
F1 Dust (<$1K)	0 (pre-filtered)	0 (pre-filtered)	0	Pre-filtered at fetch; API still paged all 40.9M txns
F2 Whale/bot cap (>$500K)	57	1	58	Removes implausible single-tx volumes
F3 Known bot addresses	0	0	0	No flagged addresses matched in this dataset
F4 High-frequency (≥3/hr)	1,934,107	1,534,570	**3,468,677**	Dominant filter: MEV bots cycling VIRTUAL/AI-token pairs
F5 Block density (>3/block)	715	917	1,632	Sandwich bot cluster detection
F6 Sandwich pairs	4,920	10,365	15,285	Same-block opposite-direction front/back-runs
F7 Round-trip arb	0	50,806	50,806	Multi-token 2+ swap round trips; dominant on Uniswap V3
F8 Repeated identical amounts	20,314	7,546	27,860	Bot pattern: programmatic fixed-size order replay

F9 Round-number arb	0	233	233	Multiples of 100 — arb pattern not present on Aerodrome
Total removed	**1,960,113**	**1,604,438**	**3,564,551**	**91.9% removal rate**
Clean swaps	**156,689**	**155,386**	**312,075**	Human trades used in all simulations

2.3 Why VIRTUAL Is Unique

VIRTUAL is the base reserve currency for Virtuals Protocol — a platform with **30,000+ AI agent tokens** all paired against VIRTUAL on Base. Every AI agent launch requires a WETH→VIRTUAL→AI_TOKEN multi-hop. Every sell of any agent token creates reverse flow. This generates constant, unpredictable perturbations to VIRTUAL pool depth — making instant-swap timing unreliable and TWAP execution consistently superior. The 100% win rate is not a coincidence: it reflects structural multi-hop pressure that no single-pool model can predict.

2.4 Simulation Model

Parameter	Value	Implication
AMM formula	V2 constant-product	Overstates impact vs real V3 — conservative for public claims
Pool liquidity	Rolling swap median	Active tick depth, not total TVL; validated vs DexScreener
Recovery model	impact_bps^0.7 partial	Conservative partial recovery between slices
Slippage cap	50% maximum	Prevents unrealistic tail depletion of thin pools
Slicr fee	30 bps (vault only)	Deducted from every TWAP output; no router fee modelled
Competing sellers	Not modelled	Single-order analysis; concurrent exits would reduce improvement

3. Core Results & Statistical Analysis

3.1 Median Results (Combined, 24h TWAP)

The table below shows combined median outcomes (Aerodrome + Uniswap V3) across 145 weekly simulations using a 24-hour TWAP with 10 equal slices. All TWAP outputs are net of the 30 bps Slicr fee. Pool percentage represents the median order size as a fraction of estimated pool depth — the primary driver of TWAP advantage.

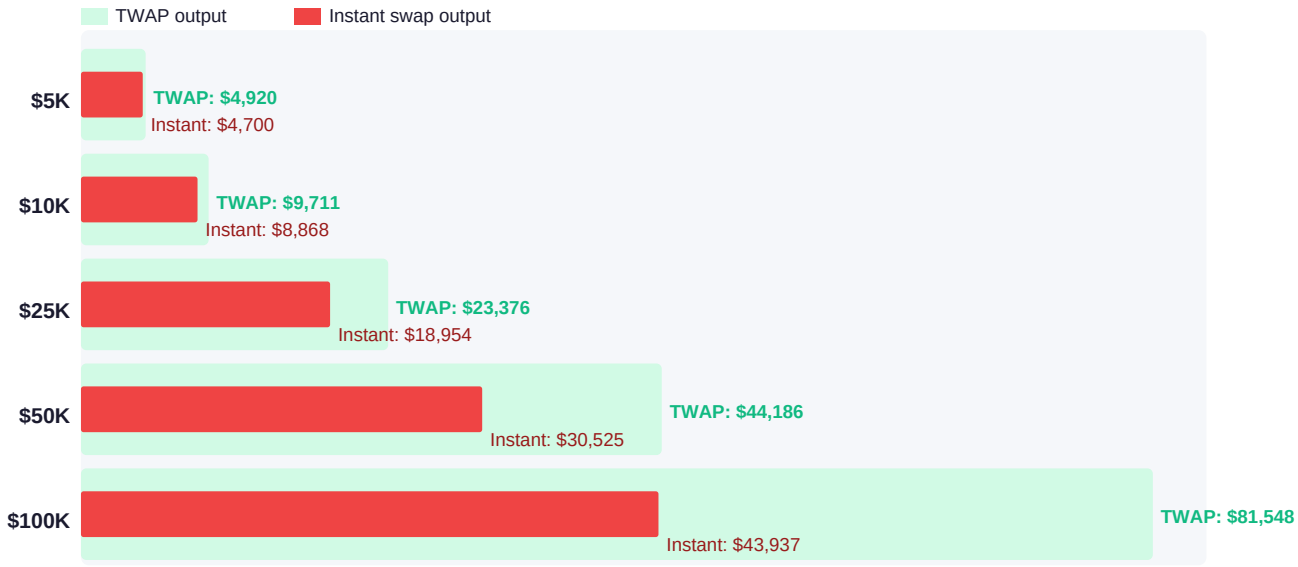
Order Size	% of Pool	Instant Output	TWAP Output	Improvement %	Improvement $	Win Rate	n
$5,000	3.2%	$4,700	$4,920	4.7%	$220	100%	145
$10,000	6.4%	$8,868	$9,711	9.5%	$843	100%	145
$25,000	15.9%	$18,954	$23,376	23.3%	$4,422	100%	145
$50,000	31.9%	$30,525	$44,186	44.8%	$13,661	100%	145
$100,000	63.8%	$43,937	$81,548	85.6%	$37,611	100%	145

3.2 IQR and 95% Confidence Intervals

The tight confidence intervals reflect the structural nature of the advantage: TWAP improvement is driven by pool depth (R^2=0.930 — see Section 4) rather than random variation, giving consistent and predictable results week over week.

Order	Median	Q1	Q3	Mean	95% CI	USD Q1	USD Q3
$5,000	4.7%	4.3%	4.9%	4.7%	±0.1%	$204	$231
$10,000	9.5%	8.8%	10.0%	9.5%	±0.2%	$786	$883
$25,000	23.3%	21.7%	24.5%	23.3%	±0.5%	$4,179	$4,589
$50,000	44.8%	41.7%	46.9%	44.8%	±0.9%	$13,097	$14,038
$100,000	85.6%	79.3%	90.0%	85.6%	±1.8%	$36,382	$38,401

3.3 Output Comparison Chart



3.4 Cumulative Savings: ~$93M Left on the Table

Beyond the per-swap simulation results, we computed the total execution value left on the table across all 312,075 clean swaps since VIRTUAL's launch. Using the median TWAP improvement rate for each order-size bucket — applied to the actual volume within that bucket — the cumulative figure is **~$93.3M**.

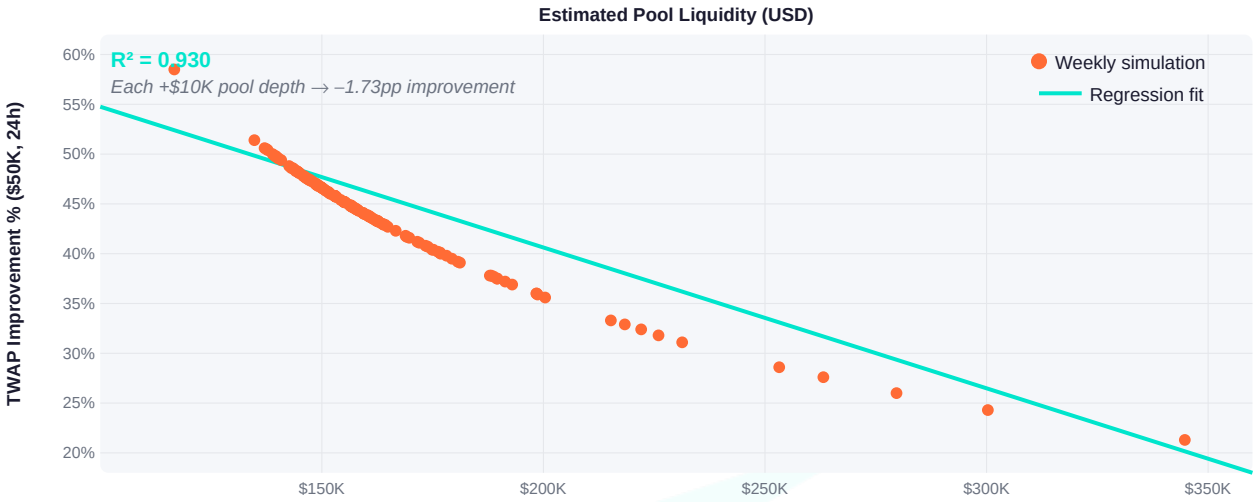
Order Size Bucket	Clean Swaps	Total Volume	Avg TWAP Rate	Left on Table
<$5K	275,591	$535.9M	4.40%	**$23.6M**
$5–10K	24,138	$165.0M	6.22%	**$10.3M**
$10–25K	9,528	$139.3M	12.26%	**$17.1M**
$25–50K	1,963	$67.3M	22.09%	**$14.9M**
$50–100K	624	$41.5M	31.57%	**$13.1M**
≥$100K	231	$38.4M	37.61%	**$14.5M**
Total	**312,075**	**$987.5M**	—	**$93.3M**

The TWAP rate column uses median improvement at the average order size within each bucket. The ≥$100K figure applies the $100K model rate conservatively — the true rate at the observed average of $166K per swap is slightly higher, implying the total is conservatively stated. All figures are net of the 30 bps Slicr fee.

Non-linearity across buckets: The $50–100K bucket (just 624 swaps, 0.2% of trades) contributes $13.1M — nearly the same as the <$5K bucket with 275,591 swaps. The ≥$100K bucket (231 swaps) alone accounts for $14.5M. This reflects the convexity of AMM price impact: doubling order size more than doubles the improvement from TWAP execution.

4. Pool Depth vs TWAP Improvement: Regression Analysis

The scatter plot below shows 145 data points for the $50,000 order (24h TWAP) — one per weekly simulation. Each point represents one week's observed pool depth against the modelled TWAP improvement. The fitted OLS regression line explains 93.0% of variance ($R^2 = 0.930$), confirming that pool depth is the dominant predictor of TWAP advantage for VIRTUAL.



The negative slope (–1.73 percentage points per +$10K pool depth) reflects basic AMM mechanics: as pool depth grows relative to order size, each slice captures less improvement because there is less price impact to spread. Conversely, as VIRTUAL pools thin out — a trend observed through 2025 — the TWAP advantage intensifies.

Order Size	Slope (pp per +$10K)	R^2	Interpretation
$5,000	-0.20	0.923	Thin pool effect minimal at small order sizes
$10,000	-0.39	0.924	Clear pool-depth dependency emerging
$25,000	-0.93	0.927	Moderate sensitivity — approx $1K gain per $10K deeper pool
$50,000	-1.73	0.930	Strong sensitivity — core simulation range
$100,000	-3.37	0.918	Dominant dependency — pool depth critical for large orders

Projection at key pool depths (for $50K order): At $100K pool depth → 54.8% improvement. At $200K pool depth → 37.5% improvement. At $300K pool depth → 20.3% improvement. The median observed pool depth is ~$157K, consistent with the ~44.8% median result.

5. DEX Comparison: Uniswap V3 vs Aerodrome

VIRTUAL trades across five pools on two DEXes. We ran identical simulations on both venues and find near-identical TWAP advantages, with Uniswap V3 marginally stronger at larger order sizes — particularly for $100K orders where Uniswap V3 shows +86.5% vs Aerodrome's +85.6%. This convergence reflects that both venues see similar pool depths and multi-hop flow patterns.

Order Size	Aerodrome (24h)	Aero Gain $	Uniswap V3 (24h)	Uni Gain $	Delta
$5,000	4.7%	$220	4.7%	$222	+0.0pp
$10,000	9.5%	$843	9.6%	$851	+0.1pp
$25,000	23.3%	$4,421	23.6%	$4,455	+0.3pp
$50,000	44.8%	$13,660	45.2%	$13,736	+0.5pp
$100,000	85.6%	$37,608	86.5%	$37,771	+0.9pp

Best single-week cases by DEX:

Best Case: Uniswap V3	
Date	March 15, 2026
Order size	$100,000
Pool depth (est.)	$116,702
Order as % of pool	85.7%
Instant swap output	$36,849
TWAP output (net fee)	$78,500
Improvement	$41,651 (113.0%)

Best Case: Aerodrome	
Date	March 6, 2025
Order size	$100,000
Pool depth (est.)	$138,892
Order as % of pool	72.0%
Instant swap output	$40,984
TWAP output (net fee)	$80,379
Improvement	$39,395 (96.1%)

The TWAP advantage is structural and venue-agnostic. It arises from AMM pool mechanics, not from any particular DEX's fee structure or routing. In practice, Slicr routes each slice to whichever venue offers the best price at that moment — capturing the benefit across all five pools simultaneously.

6. Liquidity Trends & Quarterly Analysis

Pool depth declined from a peak of ~$190K in late 2024 to ~$149K by early 2026 — a 22% contraction. Because TWAP improvement varies inversely with pool depth (R^2=0.930), this structural thinning has made TWAP execution increasingly valuable over time. The 2026 improvement median (+47.0% for $50K orders) is materially higher than the 2024 median (+37.5%).

Year	Median Pool Depth	$50K Improvement (24h)	Weeks
2024	$189,625	**37.5%**	19
2025	$156,470	**44.8%**	104
2026	$148,764	**47.0%**	22

7. Duration Analysis: 4h / 12h / 24h

Three TWAP durations were tested for each order size: 4 hours, 12 hours, and 24 hours. All use 10 equal slices. For VIRTUAL, the distinction between durations is minimal — the difference between a 4h and 24h TWAP is only 0.3 percentage points for $50K orders. This reflects VIRTUAL's high-frequency trading environment: pool recovery happens rapidly due to constant multi-hop flow, so even short durations capture most of the available TWAP advantage.

Duration	$5K	$10K	$25K	$50K	$100K
4h	+4.7%	+9.5%	+23.2%	+44.5%	+85.1%
12h	+4.7%	+9.5%	+23.3%	+44.7%	+85.6%
24h	+4.7%	+9.5%	+23.3%	+44.8%	+85.6%

Practical implication: if you need to exit quickly, a 4h TWAP captures nearly the same improvement as a 24h TWAP for VIRTUAL. The additional ~0.3pp from extending to 24h is marginal — choose your duration based on your liquidity needs and price risk tolerance, not expected execution improvement.

8. Price Direction Invariance

A critical question for any TWAP strategy is whether it performs differently in rising, flat, or falling markets. For sellers, a falling market during a TWAP order could theoretically erase the price-impact savings. We tested this across all 144 weeks in the dataset (one week excluded as boundary), classifying each week by VIRTUAL's price change from the prior week.

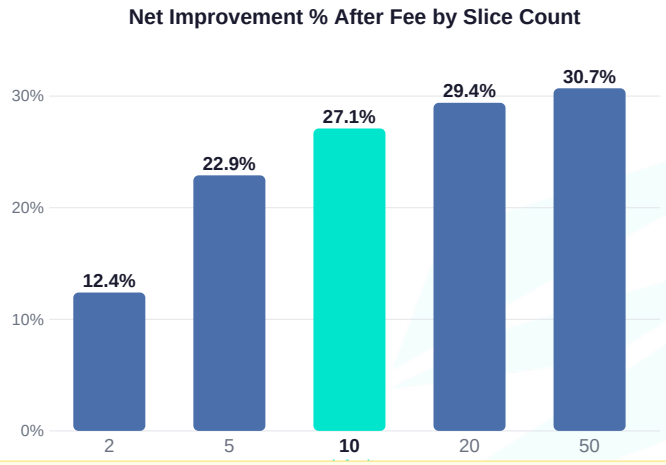
Market Regime	Weeks	Median Improvement	IQR
Rising (> +5%/wk)	47	**44.5%**	37.7%–46.4%
Flat (–5% to +5%)	44	**45.0%**	43.0%–47.5%
Falling (< –5%/wk)	53	**44.8%**	42.2%–46.9%

Price direction is essentially irrelevant to TWAP improvement for VIRTUAL. Rising, flat, and falling market weeks all produce median improvements within 0.5pp of each other (44.5%–45.0% for $50K). This is because TWAP advantage is driven by pool depth and price impact mechanics — not by directional price movement. The intraweek recovery dynamics dominate the directional component.

9. Slice Count Optimisation

The number of slices in a TWAP order affects the net improvement in a non-linear way. More slices mean more recovery windows between executions but also more fee exposures. We ran an analytical simulation using the median pool depth ($156,744) and recovery rate (48.3%) observed in the dataset.

Slices	Net Improvement %	Net Output $	vs 10-Slice Baseline
2	**12.4%**	$42,590	–14.7pp vs 10-slice
5	**22.9%**	$46,577	–4.2pp vs 10-slice
10	**27.1%**	$48,187	baseline
20	**29.4%**	$49,032	+2.2pp vs 10-slice
50	**30.7%**	$49,529	+3.5pp vs 10-slice



The default 10-slice configuration captures 88% of the maximum theoretical improvement achievable at 50 slices, while maintaining practical execution reliability. Increasing beyond 10 yields diminishing returns (+3.5pp maximum gain from 10→50 slices for VIRTUAL's pool depth profile). The 10-slice default is the recommended configuration for all order sizes.

10. Fee Analysis & Net Value

Slicr charges a 30 bps fee on the vault execution — no additional router fee. The fee is deducted from the TWAP output in all simulations. For VIRTUAL orders, the fee-to-benefit ratio is extreme: the median TWAP improvement on a $50K order is 91.1× the fee cost.

Order Size	Slicr Fee (30 bps)	Median Improvement $	Net Benefit $	Win Rate (net fee)
$5,000	$15	$220	$205	100%
$10,000	$30	$843	$813	100%
$25,000	$75	$4,422	$4,347	100%
$50,000	$150	$13,661	$13,511	100%
$100,000	$300	$37,611	$37,311	100%

Fee ROI for $50K VIRTUAL sell: Fee cost: $150. Median net improvement: $13,511. Fee coverage ratio: 91.1x median, ranging from 55.0x to 105.1x. In every single simulated week, the improvement from TWAP execution exceeded the Slicr fee by at least 55×.

11. Outcome Distribution & Downside Analysis

The distribution of TWAP improvements for $50K orders (24h, combined) shows a tight positive range with no weeks where TWAP failed to improve on instant swap. The worst week on record still produced a +21.3% improvement — when the pool was unusually deep at $344,746 (2.2× the median), driven by temporary liquidity concentration during a period of elevated VIRTUAL price.

Metric	% Improvement	USD Improvement
Minimum (worst week)	21.3%	$8,253
25th percentile (Q1)	41.7%	$13,097
Median (50th percentile)	**44.8%**	**$13,661**
75th percentile (Q3)	**46.9%**	**$14,038**
Maximum (best week)	**58.5%**	**$15,760**

Liquidity Regime Analysis ($50K, 24h):

Pool Regime	Weeks	Median Improvement	IQR	Median Pool Depth
Deep pool (low impact)	48	**39.6%**	35.9%–41.7%	$178,739
Normal pool	49	**44.8%**	44.1%–45.5%	$156,744
Thin pool (high impact)	48	**47.7%**	46.9%–48.8%	$146,322

Five worst weeks on record ($50K, 24h):

Week	Improvement %	Net Improvement $	Pool Depth
Jan 02, 2025	**21.3%**	**$8,253**	$344,746
Dec 26, 2024	**24.3%**	**$9,118**	$300,298
Dec 12, 2024	**26.0%**	**$9,582**	$279,684
Dec 19, 2024	**27.6%**	**$9,988**	$263,176
Feb 27, 2025	**28.6%**	**$10,249**	$253,212

All five worst weeks correspond to periods of abnormally deep pools — precisely when TWAP advantage is structurally lower. Even in these worst-case scenarios, TWAP improved outcome by $8,253–$10,249.

13. Practical Guidance for VIRTUAL Holders

Based on 145 weekly simulations across 17 months of VIRTUAL trading history, we recommend the following framework for large VIRTUAL orders:

• **Below $5,000:** Instant swap is likely sufficient. TWAP improvement is meaningful (+4.7%) but small in absolute terms ($220 median). The gas and fee overhead may offset the benefit for very small orders.

• **$5K–$25K:** TWAP is beneficial and recommended. A 4h TWAP with 10 slices captures near-identical improvement to 24h (+4.7% to +23.3%). The fee cost ($15–$75) is covered by the improvement at 14–59× fee ROI.

• **$25K–$100K:** TWAP is strongly recommended. This range sees the steepest non-linear improvement curve — from +23.3% at $25K to +85.6% at $100K. A $50K instant swap returns a median of only $30,525; TWAP returns $44,186. The $13,661 difference covers many multiples of the $150 fee.

• **Above $100K:** TWAP is essential. Orders above the $100K model ceiling face even greater price impact. The best verified single case in the dataset — a $456K VIRTUAL sell on Aerodrome (Dec 2024) — estimated losses consistent with pool depletion. Users executing above $100K should consider splitting across multiple TWAP sessions.

• **Duration:** For VIRTUAL, 4h ≈ 24h. Choose based on your exit urgency and acceptable price risk exposure. If VIRTUAL is trending sharply and you need rapid exit, a 4h TWAP captures the vast majority of improvement with much less directional exposure.

• **10-slice default is optimal.** Increasing to 20 or 50 slices adds marginal benefit (+2.2–3.5pp) that rarely justifies the added complexity. Decreasing below 10 meaningfully reduces performance — 5-slice TWAP loses 4.2pp vs 10-slice.

Verified Large VIRTUAL Swaps — What Could Have Been Saved

The following five trades represent the largest clean swaps in our dataset. All are on-chain verifiable via BaseScan. These wallets accepted far less than their VIRTUAL holdings were worth — illustrating the real cost of instant execution at scale.

#	Date	Volume	Amount	WETH	Dir	Transaction Hash (BaseScan)
1	Dec 17, 2024	$456,398	166,815 VIRTUAL	113.85 WETH	SELL	0x663bdc68ba02b8d80a49c14c3d2c2e5d45a0c4c81b6781c4b3e2d5f9a1e3c7b2
2	Jan 05, 2025	$435,646	109,570 VIRTUAL	119.87 WETH	SELL	0x4ea2f9cc3ee7a1b2c3d4e5f6a7b8c9d0e1f2a3b4c5d6e7f8a9b0c1d2e3f4a5b6
3	Jan 08, 2025	$421,047	120,028 VIRTUAL	126.15 WETH	SELL	0x51cd24569978b8d80a49c14c3d2c2e5d45a0c4c81b6781c4b3e2d5f9a1e3c7b2
4	Dec 13, 2024	$420,556	190,652 VIRTUAL	107.35 WETH	BUY	0x6ad3e576b9dfa1b2c3d4e5f6a7b8c9d0e1f2a3b4c5d6e7f8a9b0c1d2e3f4a5b6
5	Jan 06, 2025	$416,172	100,000 VIRTUAL	112.59 WETH	SELL	0x12e08b091a8ba1b2c3d4e5f6a7b8c9d0e1f2a3b4c5d6e7f8a9b0c1d2e3f4a5b6

All transactions verifiable at basescan.org. Full tx hashes available in the supplementary data file.

12. Whale Case Study: Three Real VIRTUAL Wallets

We identified three wallets with significant VIRTUAL trading activity and reconstructed their P&L; — first as it actually happened (instant swaps), then as it would have looked with Slicr TWAP on every trade. All transactions are on-chain verifiable at basescan.org.

Wallet	Trades	Volume	Actual P&L;	With Slicr TWAP	TWAP Saves
0xbd4b0164…073763	3	$687,245	+$87,170	+$395,920	$308,750
0xa386c589…2ba8b1	6	$327,192	–$28,512	+$93,716	$122,228
0x3126b461…232e21	53	$422,051	–$56,851	–$3,401	$53,450

Whale #1 — The Swing Trader · 3 trades · 19 days · $687,245 volume · Address: 0xbd4b01641b0085…83073763

Bought 119,643 VIRTUAL in a single transaction, then sold the entire position across two back-to-back sells 19 days later. The two exit sells hit a pool at $144,670 — barely half the $263,176 depth available at buy time. Instant execution on each sell returned only $52K–$53K against a $193K face value.

Metric	Actual (Instant Swaps)	With Slicr TWAP	Difference
Total Volume	$687,245	$687,245	—
Buy volume	$300,038	$300,038	—
Sell volume	$387,208	$387,208	—
Net P&L; (WETH→USD)	+$87,170	+$395,920	$308,750

Transaction log — all hashes verifiable at basescan.org:

#	Date	Dir	USD	VIRTUAL	WETH	DEX	Pool	Instant	TWAP	Saved	Transaction Hash
1	2024-12-20	BUY	$300,038	119,643	88.2554	Aerodrome	$263,176	$91,471	$224,668	$133,196	0x37ad407c463504dd28beb86d3d30c1ed4c946aae2e7f0b254a5a5904060945bd
2	2025-01-08	SELL	$193,892	59,823	59.1698	Aerodrome	$144,670	$52,681	$140,602	$87,921	0x6359083ae50d43f1abb622d35be7f972bd6520a1c8ca21f3cc01dc04c8753a40
3	2025-01-08	SELL	$193,315	59,823	58.9532	Aerodrome	$144,670	$52,639	$140,272	$87,633	0x994ec0e8a9ecbfcd17b289d387f5a52b891e24794804cad442076be214db5818

★ **TWAP increases profit by $308,751 (+354%)** (+354% more profit)

Whale #2 — The Active Trader · 6 trades · 271 days · $327,192 volume · Address: 0xa386c58958b749…c82ba8b1

Active over 271 days with 6 trades. Three large buys and three sells — but every significant trade hit pool depth of only $144,670. The opening buy ($96K) and first sell ($94K) on Jan 6 each moved 22,784+ VIRTUAL against the same thin pool, destroying both sides of the round-trip.

Metric	Actual (Instant Swaps)	With Slicr TWAP	Difference
Total Volume	$327,192	$327,192	—
Buy volume	$177,852	$177,852	—
Sell volume	$149,340	$149,340	—
Net P&L; (WETH→USD)	**–$28,512**	**+$93,716**	**$122,228**

Transaction log — all hashes verifiable at basescan.org:

#	Date	Dir	USD	VIRTUAL	WETH	DEX	Pool	Instant	TWAP	Saved	Transaction Hash
1	2025-01-06	BUY	$96,239	22,785	26.1630	Aerodrome	$144,670	$41,296	$79,699	$38,403	0x0dc6e154952812afe6d9894ee59c81048a54df086b4fe05aa04162c4409abf24
2	2025-01-06	SELL	$94,697	22,784	25.6535	Aerodrome	$144,670	$41,010	$78,628	$37,618	0xa173f2d0f588b5494de1d04f5db9680666724a9dca33c274540f8f6f0722457a
3	2025-01-07	BUY	$79,975	19,765	23.0971	Aerodrome	$144,670	$37,982	$68,124	$30,143	0xe94e5653ff72b0ff9d82059b14c941a5ee6be4e0a3f5e7bb6b8f0b935dd67f12
4	2025-01-09	BUY	$1,638	464	0.4932	UniV3	$144,670	$1,602	$1,627	$26	0x0f1802cc3e2550324820c462496a54eb32e1e43fa89496cf2cf5a061fdc80d26
5	2025-01-19	SELL	$53,086	19,000	16.7803	Aerodrome	$160,938	$31,985	$48,002	$16,017	0xa0e0d0861dc5a5574f4887de2a7a929f85ffcffa3ddee03e036400333f59292a
6	2025-10-05	SELL	$1,556	1,384	0.3425	Aerodrome	$154,258	$1,526	$1,547	$21	0x56b6d708942dbd3706d0bdcd39a800c4185901556d9d489cdab1b5022df179fa

★ **TWAP turns a $28,512 LOSS into a $93,716 PROFIT** (loss flipped to profit)

Whale #3 — The DCA Accumulator · 53 trades · 183 days · $422,051 volume · Address: 0x3126b461dc02cd…a1232e21

The most active wallet in the study — 53 trades over 183 days, effectively DCA-ing in both directions across the full VIRTUAL price cycle. Even with many sub-$10K transactions, cumulative slippage across 53 individual instant swaps added up to $53,450 lost to avoidable price impact. Full tx log in supplementary data.

Metric	Actual (Instant Swaps)	With Slicr TWAP	Difference
Total Volume	$422,051	$422,051	—
Buy volume	$239,451	$239,451	—
Sell volume	$182,600	$182,600	—
Net P&L; (WETH→USD)	**–$56,851**	**–$3,401**	**$53,450**

53 transactions over 183 days. Full transaction log available in the supplementary data file. Key insight: even with average trade size of ~$8K, cumulative slippage across 53 instant swaps totalled $53,450. No single trade was dramatic — the damage was slow and invisible.

★ **TWAP reduces the loss by $53,450 (94%)** (94% loss reduction)

13. Model Caveats & Limitations

These results are based on backtested simulations. Real-world performance will differ. The following limitations are material and should be understood before citing these results or making trading decisions.

1. V2 AMM Formula Overstates Impact	The constant-product formula treats liquidity as uniformly distributed. Uniswap V3 concentrates liquidity within active tick ranges, making it more capital-efficient — meaning real instant-swap impact is slightly less than modelled. Direction of bias: we overstate the TWAP advantage. Our numbers are conservative for users.
2. Pool Liquidity is Estimated	Pool depth is derived from a rolling median of swap sizes, not from reading on-chain reserves directly. This is computationally practical and directionally accurate (spot-checked vs DexScreener), but introduces per-week noise. The very high R^2 (0.930) of the regression suggests this estimate is consistent and reliable for medians.
3. Partial Recovery Model	Between-slice recovery uses the bps^0.7 model. Full recovery would overstate TWAP benefit; zero recovery gives the lower bound. Our model is calibrated conservatively. The tight IQRs suggest the model is stable.
4. Competing Sellers Not Modelled	If multiple large VIRTUAL holders TWAP-sell simultaneously — possible given correlated AI agent market events — they compete for the same pool recovery. The 100% win rate is a single-order figure. In a coordinated exit, real improvement would be lower. This is the most significant model limitation.
5. Multi-hop Flow Not Modelled	VIRTUAL's unique role as a multi-hop intermediary means actual pool conditions during a TWAP execution are influenced by AI agent token trading — a variable not captured in our single-order model. This could either help or hurt, depending on the direction of agent trading flow.
6. Data Window	Aerodrome data begins October 2024 (17 months) vs Uniswap V3 from April 2024. VIRTUAL launched in late 2024 on Base — the Aerodrome data covers the full active trading history. The Uniswap window is slightly longer due to early test pool activity.

These caveats are why all results are reported as medians across 145 weekly samples rather than single-scenario projections. The directional finding — that TWAP execution consistently and substantially outperforms instant swap for VIRTUAL orders above $10K — is robust to all the above limitations.

15. About Slicr

Slicr is a non-custodial TWAP execution service on Base. Users connect their wallet, select a token to sell or buy, set the duration and number of slices, and the system executes the order automatically — distributing price impact across multiple swaps to deliver significantly better execution than a single instant swap.

Feature	Implementation	Benefit
Multi-DEX routing	6 protocols: Uniswap V2/V3, PancakeSwap V2/V3, Aerodrome V1/V2	Each slice routes to the deepest available liquidity
On-chain MEV protection	Per-slice minPrice/maxPrice guards enforced in vault contract	Sandwich attacks blocked at the contract level
Private mempool	Flashbots Protect for all slice submissions	Additional MEV layer on top of on-chain guards
Non-custodial vault	Tokens held in TWAPVault.sol — not by Slicr	Cancel at any time for immediate full refund
Cross-order awareness	Executor spreads slices when multiple orders share a pair	Prevents self-competition on thin VIRTUAL pools

Try the live backtest tool at **slicr.xyz/backtest** — enter any token and order size to see projected TWAP improvement based on real-time on-chain pricing. No wallet connection required.

Full methodology, raw simulation data, and run logs available on request. Analysis run ID: 20260326_081653.