The Interest Parameter in Perpetual Futures: Shariah Analysis and Empirical Evidence from Centralized and Decentralized Exchanges

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Abstract

Purpose — This paper investigates whether perpetual futures can satisfy Islamic prohibitions on *riba* (interest), *gharar* (uncertainty), and *maysir* (speculation) — a question unaddressed by prior literature.

Design/methodology/approach — The study develops a four-category taxonomy of perpetual futures by funding-formula structure, collects 39,406 unique funding-rate intervals across four platforms over 365 days (February 2025 – February 2026), and analyses a cross-platform comparison — with a placebo design — between interest-bearing and interest-free DEX protocols. Shariah analysis applies El-Gamal's *riba* conditions, Kamali's standardisation criterion, and Salamon's *maysir* test.

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Findings — The interest parameter in CEX funding formulas is mathematically unnecessary. dYdX v4 operates with $I = 0$ and produces a funding distribution distinct from CEX platforms (Cohen's $d = 0.782$ at native cadence, 0.703 cadence-matched; Kolmogorov–Smirnov $D = 0.506$). Hyperliquid — a DEX using the CEX formula — clusters with CEX. Formula structure rather than exchange architecture governs the *riba* dimension of the Shariah classification.

Originality/value — The first empirically validated framework demonstrating that the *riba* component of perpetual futures funding is structurally removable, correcting an error of extrapolation in Islamic finance scholarship that treated a single CEX implementation as representative of the entire instrument class. Ownership (*qabdh*) and delivery-intent are scoped as open questions for cash-settled synthetic perpetuals.

Research limitations/implications — The empirical sample covers a single 365-day period; extension to additional time windows would strengthen external validity.

Practical implications — The taxonomy provides a screening tool for Shariah boards, fund managers, and exchange designers evaluating Shariah-compliant perpetual futures instruments.

Keywords: *riba*, *gharar*, *maysir*, perpetual futures, Islamic finance, DeFi, DEX, Shariah compliance, funding rate

JEL classification: G11, G12, G13, Z12

Article classification: Research paper

1 Introduction

Perpetual futures are the defining instrument of the cryptocurrency era, with daily trading volumes exceeding $100 billion (Chainalysis, 2025; CoinGecko, 2025). Yet for 1.8 billion Muslims, this market has been off-limits because Binance and Bybit embed a fixed, predetermined interest charge — *riba* — in their funding mechanisms, prohibited under every school

of Islamic jurisprudence. Binance labels this charge `interestRate` in its public API: 0.01% per 8 hours (10.95% per year) (Musaffa Academy, 2024; AAOIFI, 2022; Zulkarnain & Syibly, 2024). The conservative consensus is correct for CEX perpetuals.

This paper provides evidence consistent with the interest component being a design choice, not a technical requirement. Premium-only DEX protocols dYdX v4 and D8X operate with $I = 0$, and Ackerer et al. (2025) prove that $I = 0$ yields spot convergence. The *riba* dimension of Shariah compliance in perpetual futures is therefore a replicable design criterion, not a platform-specific accident. (Ownership and delivery-intent are separate questions, addressed in Section 6.)

A consistent error runs through the prior literature — treating the CEX perpetual as *the* perpetual, with the DEX alternative invisible despite operating at scale since 2023 (a review of 57 sources is reported in Section 3). We correct it through four contributions:

1. **Four-category taxonomy** of leveraged crypto derivatives by the interest parameter I and settlement date: CEX perpetual, Premium-only DEX, Hybrid DEX, and DEX expiring futures.
2. **Natural experiment** comparing dYdX ($I = 0$) and Hyperliquid ($I = 0.01\%/8\text{h}$) — both decentralised venues in the same market, differing in funding formula (with residual protocol-design confounds disclosed in Section 4).
3. **365-day empirical validation** across 39,406 funding rate intervals on four platforms.
4. **Scoped Shariah verdict.** The *riba* dimension is resolved structurally by the premium-only formula; ownership (*qabdh*) and delivery-intent remain open for cash-settled synthetic perpetuals and bound the affirmative case to RWA-backed and DEX expiring-future structures.

2 How Perpetual Futures Work and Where Riba Enters

2.1 The Funding Mechanism

A perpetual futures contract has no expiry date. Without scheduled settlement, the contract price would drift arbitrarily from the underlying spot price. The funding mechanism is the engineering solution: every 8 hours (on CEX) or every hour (on most DEX), the party whose position is "on the expensive side" pays the counterparty an amount proportional to the price gap. This continuous payment keeps the perpetual price tethered to spot.

The decisive question for Shariah compliance is not whether a payment occurs — it is *how the payment is calculated*.

2.2 The CEX Formula and Its Riba

Binance (2019) and Bybit both implement the same formula, originating from BitMEX's 2016 launch (Hayes, 2016):

$$F = P + \text{clamp}(I - P,\ -0.05\%,\ +0.05\%) \tag{1}$$

where F is the funding rate, P is the premium index (perpetual price minus spot, divided by spot), and $I = 0.01\%$ per 8 hours is the **fixed interest rate**. Binance's public API returns:

```
{
  "interestRate": "0.00010000",
  "lastFundingRate": "0.00005102"
}
```

The field is named `interestRate`. The value is always `0.00010000`. This is not interpretation; it is documentation. Three Shariah characteristics of I make it unambiguous *riba* (El-Gamal, 2006; Uddin, 2015):

- **Predetermined**: I is fixed at 0.01%/8h regardless of market conditions, counterparty creditworthiness, or economic outcome.

- **Independent**: I operates identically whether the market rises, falls, or is flat. No market outcome can eliminate it.
- **Labeled**: Binance itself calls it `interestRate` in its API. No scholarly inference is required.

Figure 1 illustrates the API evidence. The structural riba component is $I \times 3 \times 365 = 10.95\%$/year — an interest term present in every funding interval that no trading strategy can remove within CEX architectures. (Realised net funding can be smaller, or negative, when the market premium offsets it, and short positions receive rather than pay the term; the Shariah objection attaches to the presence of the predetermined charge, not to its net cost.)

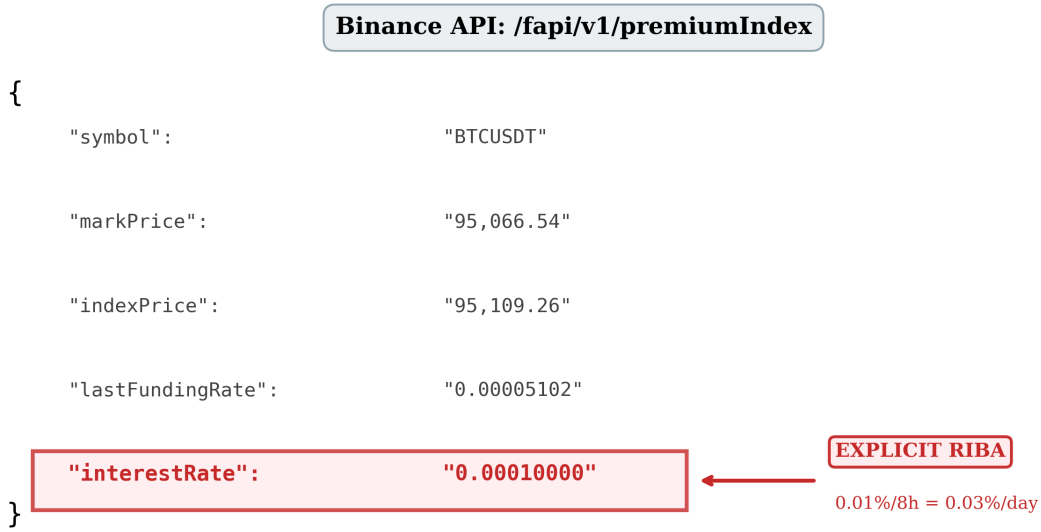

Figure 1: Binance `/fapi/v1/premiumIndex` API response. The `interestRate` field — always `0.00010000` (0.01%/8h) — is the documentary source of *riba*. This is Binance's own designation, not a Shariah inference. The structural annual burden is $0.01\% \times 3 \times 365 = 10.95\%$/year. Source: Binance public API documentation (Binance, 2019), reproduced for scholarly analysis.

2.3 The Mathematical Proof That Riba Is Unnecessary

Ackerer et al. (2025) prove that a perpetual futures contract has a unique no-arbitrage price

— equal to the spot price when account rates are aligned — when $I = 0$.

> **Theorem (Ackerer et al. 2025).** In both discrete and continuous time, with premium intensity $\kappa_t > 0$ and zero interest parameter $\iota = 0$, the no-arbitrage perpetual futures price exists and is unique. In the constant-parameter continuous case it equals
>
> $$f_t = \frac{\kappa}{\kappa + r_b - r_a} x_t,$$
>
> where r_b and r_a denote the rates of return on the margin (funding) account and on the underlying asset account respectively, in Ackerer et al.'s notation; the price equals the spot price x_t whenever $r_a = r_b$.

(We write I for the interest parameter as implemented in exchange funding formulas and ι for the same parameter in Ackerer et al.'s notation; $I = 0$ corresponds to $\iota = 0$.)

He et al. (2024) extend this framework by deriving no-arbitrage pricing bounds for perpetual futures under frictionless and frictional conditions, showing that the implied arbitrage Sharpe ratio is determined primarily by the funding-rate spread — the same I parameter that defines the riba floor.

Convergence conditions for inverse and quanto contracts follow the same pattern; the full table is reported in supplementary §S5. With $\iota = 0$, each formula reduces to a ratio involving only κ and the rate differential $(r_b - r_a)$; when rates are aligned, $f_t = x_t$ exactly.

2.4 The DEX Formula: Premium Only

dYdX v4 and D8X (D8X Exchange, 2024) implement the degenerate case of Equation (1) with $I = 0$:

$$F = P = \frac{P_{\text{perp}} - P_{\text{spot}}}{P_{\text{spot}}} \tag{2}$$

The funding rate is the signed market premium: longs pay shorts when the perpetual trades above spot, shorts pay longs when below. The payment is bilateral, conditional on market conditions, and can be zero or negative — none of the three *riba* characteristics are present.

The dYdX API returns no `interestRate` field (dYdX, 2024). D8X is a secondary reference (lower volume); empirical analysis uses dYdX v4 as the primary exemplar. Note that dYdX v4's funding parameters are governance-configurable via validator votes; the $I = 0$ specification is therefore a current policy choice rather than a protocol-immutable property, and has been retained across every market since launch through the period of analysis.

2.5 Platform Taxonomy

Not all perpetual platforms are structurally equivalent. The four-category taxonomy (Table 1) classifies instruments by two dimensions: the interest parameter I and whether a settlement date exists.

Table 1: Four-category platform taxonomy. Shariah classification is determined by the interest parameter I and the presence of a settlement date, not by CEX/DEX architecture alone.

Category	**Platforms**	**Riba source**	**Expiry**	**Shariah Status**
CEX perpetual	Binance, Bybit	0.01%/8h	No	*Riba*-bearing
Prem-only DEX	dYdX v4, D8X	None	No	Halal candidate
Hybrid DEX	Hyperliquid	0.01%/8h	No	*Riba*-bearing
DEX expiring	MCDEX, Serum (historical)	None	Yes	Strongest

Two entries deserve particular comment. **Hyperliquid** is structurally a DEX — non-custodial, on-chain settlement — yet its funding formula is analogous to Binance's (Hyperliquid, 2025): a premium component plus a fixed interest-rate term, clamped within a symmetric band (Hyperliquid pays hourly and uses an impact-price premium). Its Shariah status is therefore identical to Binance's. This exposes the literature's architectural error: calling something a DEX does not eliminate *riba*. Reading the formula does.

DEX expiring futures represent the theoretically strongest Shariah case, combining (i) no interest parameter (I is structurally inapplicable — no periodic funding mechanism); (ii) a fixed settlement date, addressing the *gharar* objection about perpetual indefiniteness; and (iii) smart-contract self-custody. Implementations have included MCDEX and Serum-based order books on Solana (both since inactive — Serum was succeeded by community

forks such as OpenBook after 2022); no venue currently operates expiring on-chain futures at the scale of the perpetual venues studied here, and liquidity fragmentation across expiry dates remains the principal practical obstacle. This paper focuses on the empirically active perpetuals market (Binance, Bybit, dYdX v4, Hyperliquid); DEX expiring futures await systematic empirical validation and are flagged in the conclusion as the most important direction for future market development.

2.6 Everlasting Options: A Forward-Looking Extension

Before turning to the literature, we note one forward-looking extension of the same $\iota = 0$ logic; readers focused on perpetual futures may skip to Section 3. Ackerer et al. (2025) extend their perpetual futures framework to derive pricing for **everlasting options** — perpetual payoff instruments that carry the right (but not the obligation) to exercise a defined payoff at any point, with no fixed expiry date. Like perpetual futures, everlasting options are sustained by a periodic premium paid by one party to the other, eliminating the need for a settlement date while preserving a well-defined payoff structure.

The premium-only pricing rule ($\iota = 0$) applies directly. Under the Ackerer et al. framework, the no-arbitrage price of an everlasting option is $f_{o,t} = \mathrm{E}[\phi(x_{\theta_t})]$, where $\phi(\cdot)$ is the payoff function, x_{θ_t} is the underlying asset price at the random stopping time θ_t — exponentially distributed with the funding intensity in the constant-parameter case — and the expectation is taken under the risk-neutral measure. When $\iota = 0$, no interest enters the pricing equation: the premium paid between counterparties is purely market-driven, determined by the option's time value and the underlying's dynamics rather than any fixed financing charge.

From a Shariah perspective, everlasting options on RWA-backed asset tokens possess several potentially favourable properties. First, the payoff is *defined* — the option buyer's maximum loss is the premium paid, and the payoff function ϕ is contractually specified. This bounded, asymmetric risk profile addresses *gharar* concerns more directly than perpetual futures, where both gain and loss are unbounded. Second, when priced with $\iota = 0$, no

fixed predetermined charge exists, satisfying El-Gamal's *riba* conditions. Third, everlasting options on commodity tokens (gold, silver, Shariah-compliant commodity indices) could enable halal hedging with more defined risk profiles than perpetual futures — the buyer knows at entry the maximum loss, while the seller is compensated by market premium, not interest.

This is explicitly a **forward-looking extension**. No *fatwa* or formal Shariah ruling currently addresses everlasting options. The standard prohibitions on conventional options — rooted in the uncertainty of the premium and the sale of a non-existent asset — may require re-examination when applied to the everlasting structure, where the premium is market-determined and no principal is transferred without delivery of the contractual payoff. Dedicated jurisprudential research is warranted before any institutional implementation. We flag this as the most theoretically significant near-term extension of the halal perpetuals research agenda, alongside DEX expiring futures (Section 8).

3 Literature Review

No paper in the prior *Islamic-finance* literature compares dYdX v4's premium-only formula to the CEX interest-bearing formula, or draws the Shariah consequence of the difference — the central gap addressed here. (The market-microstructure literature does document funding-formula variation across venue types (He et al., 2024; Chen et al., 2024); what is absent there is the interest-parameter taxonomy and its *riba* implication, and what is absent in the Islamic-finance literature is the DEX formula itself.) This finding is uniform across the 57 sources reviewed, covering perpetual-futures mechanics (Hayes, 2016; Shiller, 1993; Ackerer et al., 2025; He et al., 2024; Chen et al., 2024; Capponi & Jia, 2024; Kim & Park, 2025), *riba* (El-Gamal, 2006; Kamali, 2000; Ayub, 2007; Jobst, 2007; Solé & Jobst, 2012; Malkawi, 2014; Tashfeen, 2022; Uluyol, 2024), *gharar* (El-Gamal, 2001; Alias, 2015; Elhessi, 2018; Kasri, 2016; Alias & Othman, 2024), *maysir* (Salamon, 2015; Alias, 2021, 2023; Obaidullah, 2005), and contemporary *fatwas* and institutional standards (Musaffa Academy,

2024; SeekersGuidance, 2025; AAOIFI, 2022, 2015; DSN-MUI, 2021; Amin, 2024; Zulkarnain & Syibly, 2024).

3.1 The Progressive-Theoretical Tradition

The progressive tradition assembled, over two decades, frameworks that collectively imply premium-only DEX permissibility.

On *riba*, El-Gamal (2006) defines it as a predetermined excess independent of economic outcome; CEX funding satisfies both conditions, dYdX v4 ($I = 0$) satisfies neither. Solé & Jobst (2012) argue for the absence of a predetermined return as a primary Shariah condition for compliant derivatives (they did not consider perpetual structures, which post-date their paper). Jobst (2007) independently proposed riba-free derivative structures; dYdX v4 is the empirical realisation. Ayub (2007) contributes a three-part permissibility test (no riba, no excessive gharar, legitimate function): premium-only DEX perpetuals satisfy the riba count structurally; the remaining counts are use- and underlying-contingent (Sections 5 and 6). Kim & Park (2025) derive optimal funding-rate designs via path-dependent BSDEs, treating the interest parameter as a designable variable rather than a fixed constraint.

On *gharar*, El-Gamal (2001) reframes it as exploitative uncertainty rooted in information asymmetry — zero in DEX protocols where every participant observes the same on-chain feed and funding formula. Kamali (2000) holds that standardisation resolves gharar; DEX smart contracts are more standardised than any regulated exchange. Alias & Othman (2024) develop a five-dimension gharar framework but apply it only to CEX platforms; on DEX, every dimension yields a different verdict. On *maysir*, Salamon (2015) specifies five criteria; DEX perpetuals used for hedging satisfy none. Tashfeen (2022) explicitly calls for riba-free hedging instruments; dYdX v4 provides the first live demonstration.

3.2 The Conservative-Prohibitive Tradition

The conservative tradition is internally consistent and correct for CEX perpetuals. Obaidullah (2005) provides the foundational position that all interest-bearing components constitute

riba; Alias (2015) identifies information asymmetry as operative gharar; Kasri (2016) shows regulatory frameworks systematically fail to eliminate it. The instructive cases are post-dYdX papers reaching universal prohibition without awareness of the new instrument: Alias (2023) updates the prohibitive verdict in dYdX's launch year without mentioning it; Musaffa Academy (2024) reaches prohibition one year later, correctly identifying CEX riba but generalising to all perpetuals; AAOIFI (2022) and Zulkarnain & Syibly (2024) confirm the CEX diagnosis and apply it to the instrument class — the categorical extrapolation error.

3.3 SeekersGuidance (2025) and the Synthesis

SeekersGuidance's 2025 ruling (2025), answered by Shaykh Muhammad Carr and approved by Shaykh Faraz Rabbani, directly poses the question addressed here: *"Are crypto perpetual contracts still haram if there's no interest?"* The ruling maintains they remain impermissible because the trader still holds a position in an asset he does not own (*qabdh*). Once interest is set aside, the conservative objection shifts to ownership: *riba* is treated structurally in Section 5, *qabdh* in Section 6. DSN-MUI Fatwa 144 (DSN-MUI, 2021) classifies crypto assets as Shariah-legitimate commodities, providing institutional grounding for the RWA-backed case.

The two traditions converge on a single literature gap. The progressive tradition specified what compliant derivatives would require; the conservative tradition diagnosed CEX perpetuals as non-compliant. Neither identified that $I = 0$ was already operationally available. Chen et al. (2024) provide the missing microstructural foundation by showing that VAMM-based and oracle-pricing DEX architectures produce distinct trader behaviour; this paper makes the empirical extension to Shariah-compliant funding-rate design. Recent design-native scholarship is consistent with that direction (Ghazali et al., 2025; Alsmadi et al., 2025; S&P Global, 2025), alongside surveys of Islamic-fintech and DeFi (Hasan et al., 2025; Siyaddis et al., 2025; Al-Samhi & Al-Malki, 2024; Sarea & Grassa, 2024; Rahman et al., 2024; Naqshbandi & Shibly, 2024; Mirza et al., 2025), crypto-asset compatibility (Khalid et al., 2024; Islamic Development Bank, 2024), derivatives in Islamic capital markets (Zainudin et

al., 2024), and Shariah-compliant firms in digital settings (Farhat, 2025; Modjo et al., 2025).

4 Empirical Evidence: A Natural Experiment

4.1 Design and Data

Data were collected for 365 days (February 2025 – February 2026) from four platforms, yielding 39,406 unique intervals (Table 2). The raw dYdX v4 API export contains 88 exact duplicate records per asset, introduced by pagination overlap at page boundaries; all counts and statistics reported here use the deduplicated series. The dataset constitutes a **quasi-experimental comparison** (platforms differ in clientele, leverage, fees, and liquidity alongside the funding formula, so we claim consistency rather than identification): within the DEX category, dYdX v4 ($I = 0$) and Hyperliquid ($I = 0.01\%/8\text{h}$) operate in the same market over the same period with different values of I. Several confounds are acknowledged. The CEX-vs-DEX comparison is affected by sampling-cadence asymmetry (8-hour vs hourly) and by different fee-revenue and trader-demographic conditions. The dYdX-vs-Hyperliquid comparison is cleaner on those dimensions but carries protocol-design confounds: Hyperliquid uses an impact-price premium and an HLP house market-maker vault, while dYdX v4 uses an oracle-pricing premium with an external market-maker model. We therefore report a within-DEX distributional comparison whose primary differentiator is the interest parameter, not a controlled experiment. If the interest parameter matters, the two DEXs should produce different distributions; if architecture matters, similar ones.

Data were collected via public APIs at each platform's native interval: 8-hourly for CEX; hourly for dYdX v4 and Hyperliquid. Figure 2 shows the complete 365-day time series.

A scope limitation should be noted explicitly. The empirical evidence in this paper is drawn entirely from cash-settled BTC and ETH perpetuals on dYdX v4 — the case the Shariah analysis treats as *open* on *qabdh* and *kali bil kali* grounds (Section 6). The affirmative Shariah case the paper builds (RWA-backed perpetuals; DEX expiring futures) does not yet have comparable 365-day operational data. Our empirical claim is therefore

limited to the *riba* dimension — where formula structure determines distributional outcome — and does not extend to the broader Shariah verdict for the affirmative categories. We treat the empirical-vs-affirmative-case asymmetry as a stated limitation; closing it through 365-day datasets on RWA-backed and DEX expiring contracts is the most important direction for future empirical work.

Table 2: Funding rate descriptive statistics, 365-day dataset (February 2025 – February 2026). CEX figures are per 8-hour interval. dYdX v4 and Hyperliquid figures are per native 1-hour interval. Annualised comparisons: CEX mean $\approx 0.0039\% \times 3 \times 365 \approx 4.3\%$/year; dYdX v4 mean $\approx 0.0008\% \times 24 \times 365 \approx 7.0\%$/year. Shariah classification is determined by the interest parameter I, not by CEX/DEX architecture.

Platform	**Asset**	**Category**	N	**Mean**	**Std**	**Min**	**Max**	**Neg.%**
Binance	BTC	CEX	1,095	0.0041%/8h	0.0043%	−0.015%	+0.010%	15.7%
Binance	ETH	CEX	1,095	0.0037%/8h	0.0050%	−0.037%	+0.010%	19.7%
Bybit	BTC	CEX	1,094	0.0040%/8h	0.0050%	−0.029%	+0.011%	21.6%
Bybit	ETH	CEX	1,094	0.0038%/8h	0.0067%	−0.118%[a]	+0.010%	25.8%
CEX pooled			*4,378*	*0.0039%/8h*				*20.7%*[b]
dYdX v4	BTC	Prem-DEX ($I = 0$)	8,754	0.0006%/1h	0.0019%	−0.013%	+0.054%	30.7%
dYdX v4	ETH	Prem-DEX ($I = 0$)	8,754	0.0010%/1h	0.0019%	−0.014%	+0.022%	20.5%
dYdX pooled			*17,508*	*0.0008%/1h*				*25.6%*[b]
Hyperliquid	BTC	Hybrid-DEX ($I > 0$)	8,760	0.0011%/1h	0.0013%	−0.009%	+0.023%	11.8%
Hyperliquid	ETH	Hybrid-DEX ($I > 0$)	8,760	0.0009%/1h	0.0015%	−0.039%	+0.015%	18.2%
Hyp. pooled			*17,520*	*0.0010%/1h*				*15.0%*

[a] Single-event extreme during an acute market backwardation episode (intra-sample; full date and supporting data in the supplementary materials and Zenodo dataset). Excluding this observation does not qualitatively alter the results. N (total) = 39,406.
[b] Pooled CEX mean and Neg. pct are simple averages across the four CEX rows (sample sizes are nearly equal: n = 1,094–1,095); pooled dYdX figures average across the two dYdX rows (n = 8,754 each, after removal of 88 exact duplicate records per asset introduced by API pagination overlap).

4.2 The Natural Experiment: Results

4.2.1 The Primary Test: CEX vs. Premium-only DEX

Table 3 presents three tests comparing CEX (Binance + Bybit) against dYdX v4 under the null that the two distributions are drawn from the same population. Welch's t, Mann–Whitney U, and Kolmogorov–Smirnov all reject decisively.

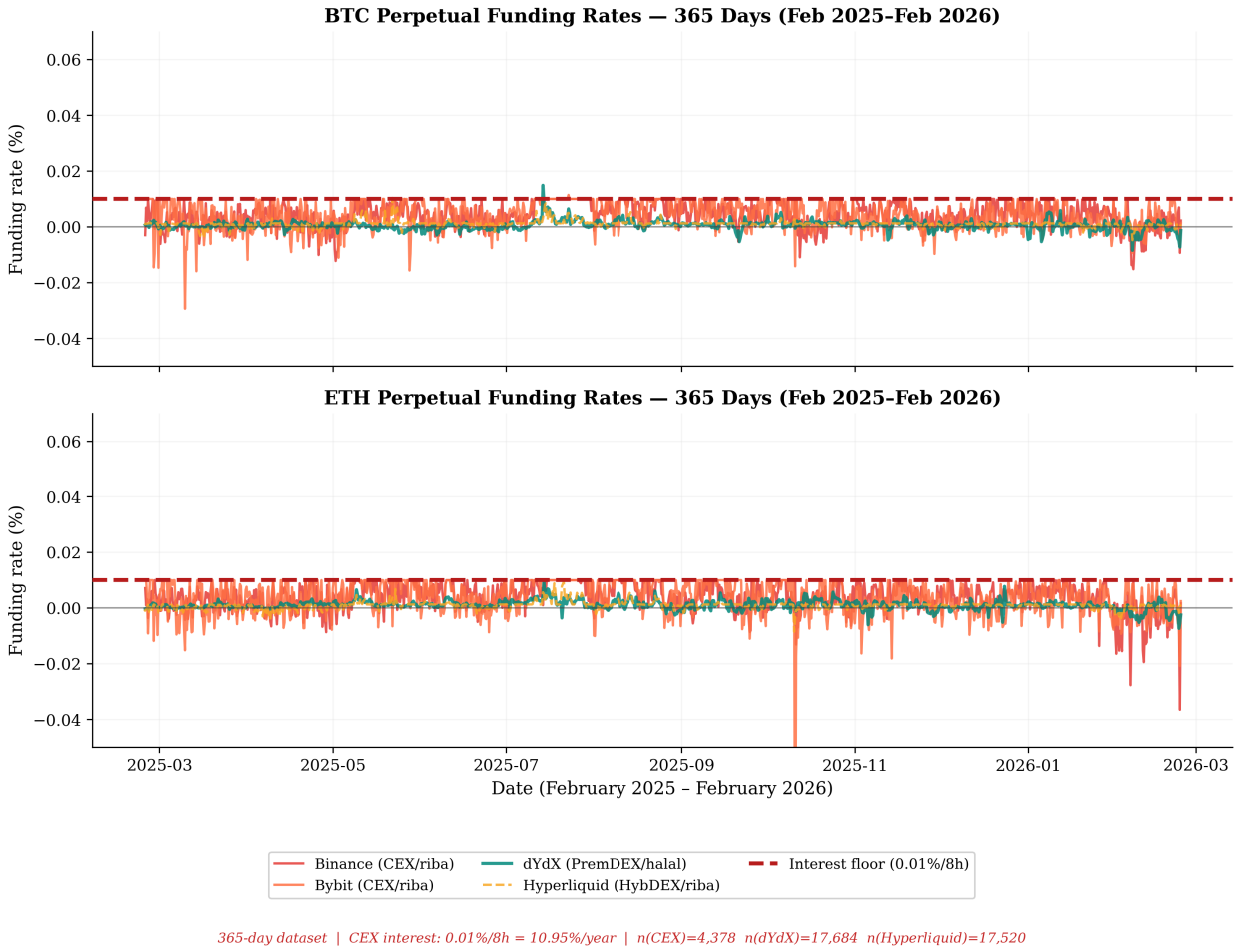

Figure 2: 365-day funding rate time series: CEX (Binance, Bybit) cluster above zero, anchored by I; dYdX v4 oscillates around zero; Hyperliquid mirrors CEX despite DEX architecture, confirming formula determines outcome. Source: authors' calculations from the Zenodo dataset cited under Data Availability.

Table 3: Statistical tests: CEX ($n = 4{,}378$ per 8h) vs. dYdX v4 ($n = 17{,}508$ per hour). Hyperliquid is excluded from this comparison as it uses $I = 0.01\%/8\text{h}$. Statistics are computed on per-interval funding rates at each venue's native cadence (8h vs. 1h) and therefore measure joint formula-plus-cadence distributional separation; cadence-matched statistics (dYdX aggregated to 8h: Welch's $t = 35.69$, Cohen's $d = 0.703$) are reported in supplementary §S2.

Test	**Statistic**	***p*-value**
Welch's t-test[1]	$t = 38.25$	$< 10^{-277}$
Mann–Whitney U	$U = 56{,}395{,}039$	$< 10^{-300}$
Kolmogorov–Smirnov[2]	$D = 0.506$	$< 10^{-300}$
Cohen's d (effect size)[3]	$d = 0.782$	Medium–Large

[1]Welch's t-test (unequal variances) reported given unequal sample sizes (CEX $n = 4{,}378$ vs dYdX $n = 17{,}508$); Mann–Whitney and KS confirm.
[2]KS p-value at computational lower bound; scipy reports $p < 6.4 \times 10^{-306}$.
[3]Computed with the unweighted root-mean-square of the two sample variances, the conservative choice under the pronounced variance heterogeneity here (CEX variance $\approx 7.7\times$ dYdX); the n-weighted pooled-SD convention yields $d = 1.07$. The cadence-matched $d = 0.703$ in supplementary §S2 uses the pooled-SD convention.

The KS statistic ($D = 0.506$) indicates that at the point of maximal separation the two empirical CDFs differ by 50.6 percentage points; Cohen's $d = 0.782$ sits at the boundary of medium and large under Cohen's 1988 convention, persisting across the full sample window.

The interest floor, measured directly. The cleanest signature of the interest parameter is not the mean but how often the rate rests *exactly at* the interest component. Whenever the premium lies within the clamp band of the interest rate ($P \in [I - 0.05\%,\ I + 0.05\%]$, i.e. $P \in [-0.04\%, +0.06\%]$ at $I = 0.01\%$), the CEX formula (1) collapses to $F = I$ — the funding pins to the interest rate itself. On the study dataset, CEX BTC/ETH funding sits at the I-floor in a substantial fraction of intervals (Binance 13.7%, Bybit 23.4%), whereas dYdX v4 — with no interest term to pin to — does so in 0%. This is the mechanism in raw form: the $I > 0$ venues cannot fund below I unless the premium falls more than the clamp width below it ($P < -0.04\%$) — producing a mass point at $F = I$ and a suppressed negative tail — while the $I = 0$ venue oscillates symmetrically through zero (negative in 25.6% of intervals, against 17.7% for Binance). A floor-binding frequency of exactly zero on the $I = 0$ venue is direct confirmation that the riba is in the *formula*, not the venue.

Two features warrant robustness checks: cadence asymmetry (CEX 8h vs DEX 1h) and funding-rate autocorrelation. Frequency-matching the dYdX series to 8h means yields Welch's $t = 35.69$ and Cohen's $d = 0.703$; a moving block-bootstrap (Politis–White $b = 50$, 2,000 replicates) yields a 95% CI on Welch's t of $[30.3, 47.6]$. Direction, order of magnitude, and effect size survive both checks (full statistics in supplementary §S2). The extreme p-values in Table 3 should be read as lower bounds on statistical distinguishability.

4.2.2 The Control: Hyperliquid vs. dYdX

If DEX structure were the operative variable, Hyperliquid and dYdX v4 — both DEXs, same market, same period — should produce similar distributions. They do not. Pooled negative-rate frequency (BTC+ETH) is 25.6% for dYdX v4 versus 15.0% for Hyperliquid: the platform with $I = 0$ shows *higher* negative frequency, consistent with a symmetric mechanism unanchored from zero, while Hyperliquid's interest floor creates an upward bias identical in character to CEX (BTC-only values are reported in Figure 4). Hyperliquid's distribution clusters with CEX (both positively biased), not with dYdX v4 (symmetric). Architecture does not determine shape; the interest parameter does. Chen et al. (2024) document the same pattern across VAMM-based and oracle-pricing DEX architectures; Ruan & Streltsov (2025) provide causal evidence from the Huobi perpetual removal that perpetual futures contracts reshape market microstructure through the funding mechanism.

4.2.3 Distributional Evidence

Figure 3 compares distributions across the three observed categories (DEX expiring futures excluded for lack of 365-day data); a per-platform boxplot is provided in supplementary §S4. Figure 4 shows negative-rate frequencies: platforms with $I > 0$ are suppressed in the negative tail because the interest component offsets downward premiums.

4.3 The Structural vs. Observed Cost Distinction

A crucial Shariah distinction operates at the cost level: structural riba versus observed market premium. CEX structural riba (unavoidable) is $0.01\% \times 3 \times 365 = \mathbf{10.95}\%$/year; CEX

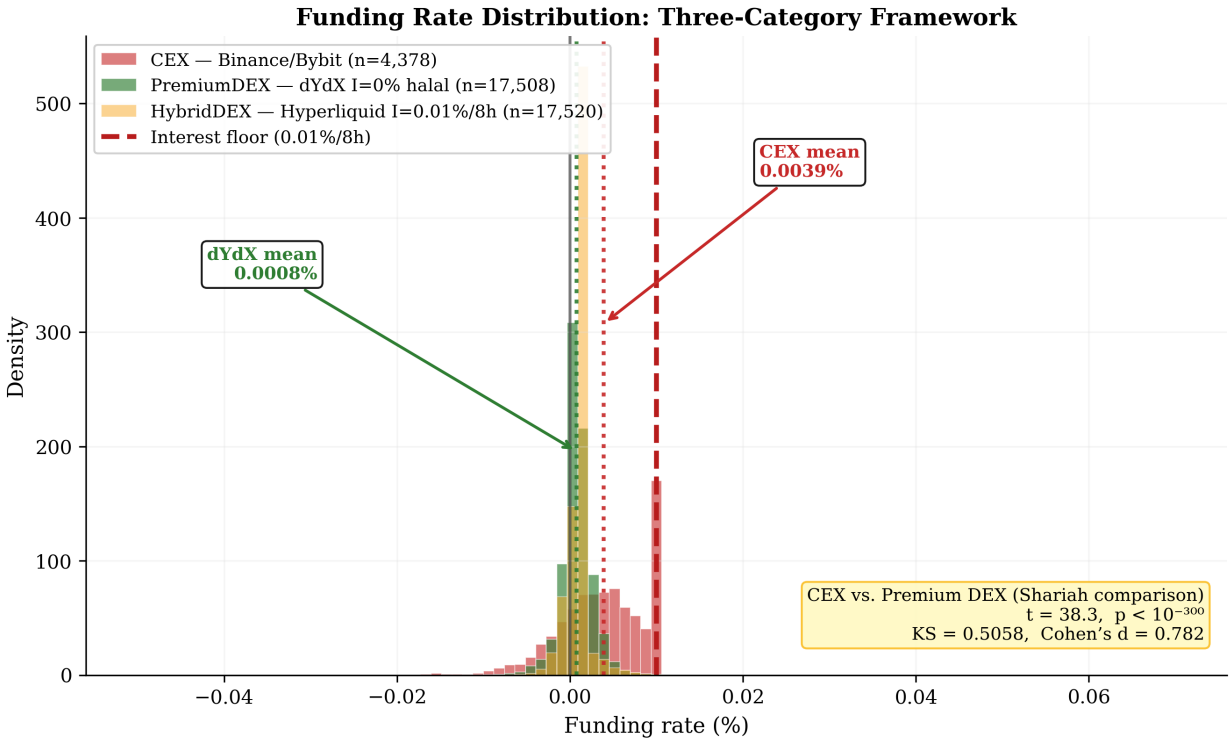

Figure 3: Funding rate distributions by category. CEX (red, $n = 4{,}378$) is skewed positive by the interest floor. dYdX v4 (green, $n = 17{,}508$) is centred near zero, consistent with $I = 0$. Hyperliquid (amber, $n = 17{,}520$) clusters with CEX despite its DEX architecture. Cohen's $d = 0.782$, KS $= 0.506$ (CEX vs. dYdX). Source: authors' calculations from the Zenodo dataset cited under Data Availability.

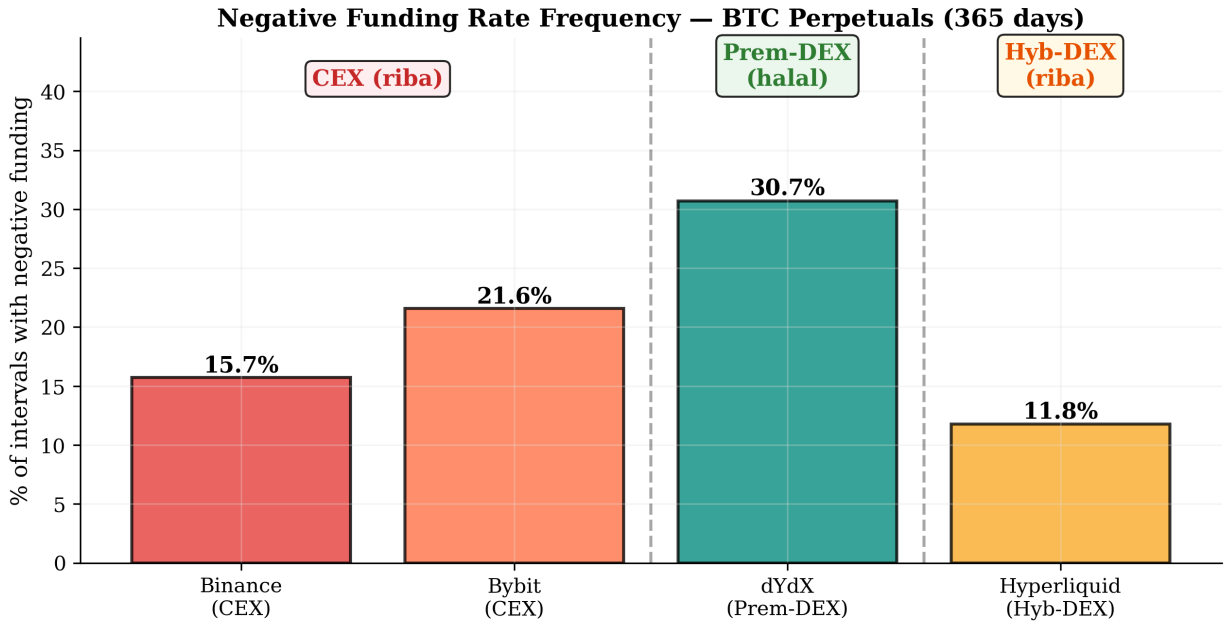

Figure 4: Negative funding rate frequency by platform (BTC, 365 days). dYdX v4 (≈30.7%, $I = 0$) shows the highest negative-rate frequency — the signature of an unconstrained symmetric mechanism. Hyperliquid (11.8%, $I > 0$) shows the lowest — the interest floor suppresses negative rates below the BTC-only CEX average (18.6%; Binance 15.7%, Bybit 21.6%), confirming the formula dominates over architecture. Source: authors' calculations from the Zenodo dataset cited under Data Availability.

observed total (interest + premium) is ≈ **4.3**%/year over the 365-day sample (pooled mean, Table 2), below 10.95% because negative premiums during downward-premium episodes within the sample partially offset the interest term — but the *riba* component is present in every interval. dYdX v4 structural riba is **0**%/year; observed total ≈ **7.0**%/year during the 2025 bull period [1]. This exceeds CEX's observed total, but every dollar is bilateral market transfer between traders, not interest. The Shariah position of a Muslim paying 7.0% in halal premium is categorically different from paying 4.3% containing inextricable riba.

The Shariah verdict therefore does not depend on which number is larger: it depends on whether a fixed predetermined charge is present at all (graphical comparison in supplementary §S4). One residual conservative objection deserves direct address: cross-venue arbitrage might cause the premium on a premium-only DEX to partially internalise the risk-free rate, so $I = 0$ may not eliminate implicit cost-of-carry economics, only relabel them. The Shariah test under El-Gamal (2006) and Solé & Jobst (2012) is contractual structure (presence of a predetermined excess), not equilibrium economics; the dYdX v4 equilibrium premium is in fact negative in 30.7% of BTC intervals, which pure cost-of-carry internalisation does not predict; and any residual implicit-rate component is bilateral between traders, which the classical *hamish jiddiyyah* structure permits.

5 Shariah Analysis

This study applies the three canonical Islamic finance prohibitions across all four platform categories. Table 4 summarises the verdicts. The *riba* verdict follows from reading the funding formula directly; the empirical evidence in Section 4 illustrates the distributional consequences of that formula choice rather than constituting a free-standing proof. Ownership (*qabdh*) and delivery intent apply at the level of the specific underlying rather than the funding formula, and are treated in Section 6 (Objections 4 and 5). Primary analysis focuses on Premium-only DEX perpetuals (dYdX v4, $I = 0$) as the empirically validated category; DEX expiring futures are discussed as a theoretically superior alternative pending liquidity

development.

Table 4: Shariah verdicts by category and prohibition.

Category	Riba	Gharar	Maysir	Overall
CEX perpetual	Haram	Concern	Struct.	Haram
Hybrid DEX	Haram	Reduced	Struct.	Haram
Prem-only DEX	Clear	Reduced	Low	Candidate
DEX expiring	N/A	Minimal	Low+	Strongest

Struct. = structural maysir pressure from riba floor (leverage + carry cost ⇒ speculative incentive).

Low/Low+ = structural maysir pressure absent; verdict depends on trader intent and documentation.

Overall verdict for the Prem-only DEX row refers to the three canonical prohibitions; the ownership (*qabdh*) and delivery-intent considerations bound the "Candidate" verdict and are addressed in Section 6 (Objections 4 and 5).

5.1 Riba: The Decisive Prohibition

Riba is the decisive prohibition because it operates structurally, not conditionally. El-Gamal (2006)'s operational reformulation of the classical *riba al-nasi'ah* doctrine identifies two conditions for an excess to constitute *riba*: the excess is predetermined, and it operates independently of any economic outcome (this is El-Gamal's economic operationalisation; the classical juristic definition additionally requires deferred exchange of *ribawi* counter-values, see also Chapra 1985). CEX interest ($I = 0.01\%/8\text{h}$) satisfies both operational conditions. The dYdX v4 premium satisfies neither: it is set at the time of payment by the perpetual-vs-spot price gap, and can be zero, positive, or negative.

Solé & Jobst (2012) stress the absence of a predetermined return as the primary Shariah condition for compliant derivatives, a principle the dYdX v4 formula satisfies. Notably, the SeekersGuidance (2025) ruling holds perpetuals impermissible on ownership rather than *riba* grounds: it sets *riba* aside as moot once *qabdh* is found wanting, rather than affirmatively conceding the *riba* point. We address the ownership question in Section 6.

5.2 Gharar: Substantially Reduced

The *gharar* prohibition derives from the hadith in *Sahih Muslim*, *Kitab al-Buyu'* (no. 1513 in the modern Dar al-Salam numbering) forbidding the sale of *gharar*, operationalised by El-Gamal (2001) as exploitative uncertainty — one party exploiting superior information

against another (see also Alias, 2015; Alias & Othman, 2024; Kamali, 2000). The question is whether any uncertainty is of the prohibited exploitative type.

A specific subcategory relevant to perpetuals is *bay' ma'dum* — the sale of a non-existent or undeliverable asset (*Sunan al-Tirmidhi*, *Kitab al-Buyu'*, no. 1232). Cash-settled CEX perpetuals raise this concern: the trader never possesses the underlying, and settlement is in a numeraire disconnected from physical delivery. DEX perpetuals on RWA-backed tokens address it by tying the position to a genuinely existent, deliverable underlying.

DEX smart contracts address *gharar* more completely than unregulated or offshore derivatives platforms: contractual terms are published in immutable on-chain code, publicly auditable; price discovery occurs through public order books or AMM formulas; loss is bounded automatically by liquidation at the margin threshold, eliminating the unbounded-loss *gharar* of uncollateralised OTC contracts (Obaidullah, 2005). DEX protocols achieve zero information asymmetry by design, and Kamali (2000)'s standardisation criterion is satisfied more strictly by smart-contract rules than by any regulatory standard — mathematically enforced rather than institutionally promised.

We conclude that *gharar* is substantially reduced in DEX perpetuals relative to CEX and OTC alternatives when assessed against the El-Gamal and Kamali frameworks; whether the residual uncertainty falls below the prohibition threshold is a determination for qualified Shariah scholars, to which this structural analysis is input. The residual technical concern — oracle risk in price-feed computation — warrants separate Shariah analysis as the oracle ecosystem matures.

5.3 Maysir: Conditional on Use

The *maysir* prohibition is grounded in Qur'an 5:90: classical jurists interpreted it as any transaction in which wealth transfers through pure chance without productive economic function. In a derivatives context this requires zero productive function, pure chance determination, and one-sided wealth transfer (Salamon, 2015; Alias, 2021). The prohibition is use-contingent rather than structural: the same instrument can constitute *maysir* in specu-

lation and legitimate commerce in hedging.

Applied across categories: **CEX and Hybrid DEX perpetuals** embed a structural interest component of 10.95%/year of notional — at conservative 3× leverage, an interest term of 32.85%/year of equity embedded in the funding formula — structural pressure toward longer holds and directional speculation. **Premium-only DEX perpetuals** have no such floor: a hedger offsetting a BTC spot position pays only the market premium, making short-horizon hedging genuinely feasible and satisfying the productive-economic-function criterion; the bilateral transfer structure mirrors established markets not classified as maysir. **DEX expiring futures** provide the strongest maysir distinction: fixed settlement dates require speculative positions to be re-established at each expiry, providing transaction-level evidence of intentionality (*niyyah*) absent in perpetually-held positions.

The zero-sum critique raised by AAOIFI (2022) applies equally to insurance contracts and secondary-market equity trading, neither of which classical scholars prohibit as *maysir*. Salamon's *maysir* test — productive economic function, skill vs. chance, bilateral transfer, documented intent, absence of excessive leverage — yields the same pattern: CEX perpetuals score poorly on structural grounds; premium-only DEX perpetuals on economic-function and bilateral-transfer grounds; DEX expiring futures on documented-intent grounds.

6 Conservative Objections and Rebuttals

We address six objections systematically. Where possible, we cite the objection's own scholarship to demonstrate that the concern is addressed rather than dismissed.

6.1 Objection 1: Riba Persists Through Leverage and Implicit Credit

"Even without the explicit interest parameter, leverage implies a loan that bears implicit interest." — SeekersGuidance (SeekersGuidance, 2025).

Response. In DEX perpetuals, no loan is extended. The trader deposits collateral (margin); the protocol does not advance credit. This is structurally equivalent to the clas-

sical *hamish jiddiyyah* (security deposit), not a loan. Premium payments are bilateral market transfers between counterparties — not financing charges from a lender (Solé & Jobst, 2012; Malkawi, 2014). Once the explicit interest parameter is removed, the implicit-interest-through-leverage argument loses its foothold.

6.2 Objection 2: Gharar From Perpetual Nature and Price Uncertainty

"The absence of a settlement date creates excessive gharar." — Musaffa (2024); Alias (2015).

Response. Perpetual nature does not constitute prohibited *gharar*. Contract terms are fully specified: funding formula hardcoded, margin requirements known, liquidation threshold public. The absence of a settlement date is a feature, not an ambiguity — and the absence of expiry removes the *bay' al-kali bil kali* gharar that classical scholars identified. Automated liquidation bounds loss to deposited margin (Kamali, 2000; Elhessi, 2018).

6.3 Objection 3: Maysir Through Zero-Sum Structure

"One party wins only because another loses — this is gambling." — AAOIFI (2022); Alias (2021).

Response. Every secondary-market transaction has buyer and seller; every insurance contract has premium-payer and beneficiary. If zero-sum payoff structure constitutes *maysir*, all secondary-market activity is prohibited — a conclusion no classical scholar has reached. The operative test is *economic utility*, not aggregate payoff symmetry (Ayub, 2007; El-Gamal, 2006). Derivatives markets transfer unwanted risk from hedgers to willing risk-takers; Kamali (2000) and Ayub (2007) permit instruments serving this function.

6.4 Objection 4: Non-Ownership and Qabdh (Possession) Requirement

"Do not sell what you do not possess" (*Sunan al-Tirmidhi, Kitab al-Buyu'*, no. 1232) — SeekersGuidance (SeekersGuidance, 2025).

Response. Once the *riba* parameter is neutralised by a premium-only formula, *qabdh* becomes the binding constraint. We treat it in two layers: contract classes where the Shariah

case is strong, and the empirical exemplar where it is partial.

Strong cases (RWA-backed perpetuals; DEX expiring futures). DEX perpetuals written on tokenised gold or commodity claims represent a verified legal claim on a physical asset held in custody, satisfying the ownership requirement directly; DSN-MUI (2021) provides the institutional foundation. (Tokenised-gold cases raise a separate *sarf taqabud* constraint, outside the scope of this paper.) Classical precedent permits *salam* and *istisna*, both involving payment before delivery; the *qabdh* requirement is not absolute, and DEX expiring futures are structurally analogous to *salam*. AAOIFI's communications on digital assets (AAOIFI, 2022) and the growing *fiqh* literature on constructive *qabdh* (exclusive, transferable on-chain entitlements) increasingly support treating DEX token positions as satisfying ownership requirements.

Hard case (cash-settled BTC and ETH perpetuals). The trader's position is not possession of the underlying; it is an entitlement to a cash-settled price claim against the protocol. The *salam* analogy is imperfect, since *salam* contemplates delivery of a specific real commodity. Two partial defences exist: the constructive-*qabdh* literature noted above, which treats on-chain entitlements as an electronic possession analogue (AAOIFI, 2022); and the narrower scoping claim that the Shariah-compliant application of the premium-only formula is most defensible on RWA-backed and DEX expiring-future cases. The cash-settled synthetic case is treated as open, not as resolved by this paper.

6.5 Objection 5: Usmani's Twin Objections and OIC Fiqh Academy Resolution 63

Usmani (2015) raises two distinct arguments against futures, both of which apply with full force to cash-settled synthetic perpetuals and warrant separate treatment.

Objection 5a (delivery intent). Futures are not Shariah-compatible because parties typically do not intend delivery; the exercise collapses into an exchange of price differentials rather than a transfer of the underlying. OIC Fiqh Academy Resolution 63 (OIC Fiqh Academy, 1992) reaches a compatible conclusion on *gharar* and gambling grounds, holding that standard futures and options transactions are impermissible because the subject of the

contract is neither a sum of money, a utility, nor a financial right that can be waived.

Response (5a). The delivery-intent objection is correctly directed at contracts used purely for speculative price-differential settlement and applies with equal force to the CEX case analysed in this paper. For hedging-motivated use on RWA-backed perpetuals or DEX expiring-future instruments, delivery intent is present by construction at the expiration of the contract. The premium-only cash-settled perpetual on BTC or ETH does not in general involve delivery intent, which reinforces the scoping set out in Objection 4: the paper's affirmative case runs through RWA-backed and DEX expiring structures.

*Objection 5b (**bay' al-kali bil kali**).* A more fundamental argument: cash-settled perpetuals reduce to the exchange of one deferred payment claim for another, which the classical jurists classified as *bay' al-kali bil kali* (sale of debt for debt). This is prohibited under a hadith reported in *Sunan al-Daraqutni*; the hadith's *isnad* is contested (some classical muhaddithun grade it weak), but the prohibition is widely accepted across the major schools on the basis of consensus (*ijma'*) and analogical reasoning (Usmani, 2015, 2002; AAOIFI, 2022), although Ibn Taymiyyah and Ibn Qayyim narrow the *ijma'* claim to specific debt-for-debt configurations (Ibn Taymiyyah, 1995). Each side of a perpetual position is, in this reading, a claim against the future settlement flow rather than a sale of an existent commodity.

Response (5b). The *kali bil kali* argument is the sharpest objection in the conservative literature for the cash-settled case. Three observations limit its force. First, the classical *kali bil kali* prohibition contemplates a debt-for-debt exchange where neither side possesses consideration; a DEX perpetual position is collateralised against deposited margin (the trader's own funds), so neither side is purely deferred in the classical sense. Second, the funding mechanism is a continuous bilateral transfer rather than deferred settlement of a fixed notional; on a premium-only formula, no party owes a predetermined sum at any future date. Third, the objection retains its force for any position taken without a hedging rationale, irrespective of formula. We nevertheless read *kali bil kali* as a genuine residual constraint on cash-settled synthetic perpetuals that the affirmative RWA-backed and DEX expiring cases

do not encounter, consistent with the bounded scope: *riba* resolved structurally; ownership, delivery-intent, and *kali bil kali* open for cash-settled synthetic structures.

6.6 Objection 6: Societal Harm Through Excessive Speculation

"High-leverage derivatives cause financial instability and individual ruin." — DSN-MUI (2021); Kasri (2016).

Response. This objection applies to *irresponsible use*, not to the instrument itself. The same critique applies to margin lending in equities, FX trading, and leveraged property investment — none categorically prohibited. DEX perpetuals used with disciplined position sizing ($\leq 3\times$ leverage), algorithmic stop-losses, and productive underlying assets are no more harmful than established leveraged instruments. The *maqasid al-Shariah* objective of protecting wealth (*hifz al-mal*) is served by appropriate risk management, not categorical exclusion.

7 Implementation Framework for Muslim Traders

This framework operationalises the paper's findings as a screening tool. The formula test below settles the *riba* dimension; asset selection and intent documentation address the ownership (*qabdh*) and *maysir* dimensions that Section 6 leaves contingent on the underlying and the trader.

7.1 Platform Selection: The Formula Test

The single most important selection criterion is the interest parameter I in the funding formula, documented in each platform's official API and technical documentation. Do not rely on marketing descriptions such as "decentralised" or "non-custodial."

Riba-free formula (passes the formula test): dYdX v4 (`I=0`, documented (dYdX, 2024)) and D8X (`I=0`, documented (D8X Exchange, 2024)).

Riba-bearing despite DEX architecture: Hyperliquid (`I=0.01%/8h`, documented (Hyperliquid, 2025)). Using Hyperliquid subjects a Muslim trader to the identical *riba* burden

as using Binance.

As new DEX platforms emerge, verify the funding formula documentation before participation. Smart contract governance may alter parameters over time; continuous monitoring is required.

7.2 Asset Selection: Productive Underlying

Prioritise perpetuals on assets with demonstrated economic utility:

- **Commodity-backed tokens** (gold, silver, oil tokens) — directly relevant to *qabdh* and *maqasid* arguments.
- **Infrastructure tokens** with significant productive usage (network fee revenue, validator staking).
- **Tokenised real-world assets** (RWA tokens representing verified physical assets).

Avoid perpetuals on purely speculative or utility-less tokens. Asset selection strengthens the maysir analysis by establishing genuine economic purpose (Kalimullina, 2020). The leading near-term exemplars are perpetuals on vault-secured tokenised gold (inflation and currency-risk hedging for businesses in volatile-currency jurisdictions) and on tokenised sukuk yields (balance-sheet liquidity management without interest-rate swaps) — risk-transfer applications in which the position offsets a real exposure, consistent with the asset-backing, possession, insurable-interest, and delivery conditions developed in companion work; neither instrument is claimed to exist or to be certified today.

Note on everlasting options: For certain hedging applications — particularly those requiring a defined maximum loss rather than an uncapped directional position — everlasting options on RWA-backed commodity tokens (Section 2.6) may offer superior Shariah defensibility compared to perpetual futures. The bounded payoff structure addresses *gharar* concerns more directly, and pricing without interest ($\iota = 0$) preserves the structural *riba*-free character. Pending dedicated scholarly review and formal *fatwa*, institutions with more conservative Shariah requirements should note this instrument class as a potentially stronger candidate

for board approval than outright perpetual futures positions.

7.3 Risk Management: Parameters

Implement disciplined position management consistent with *hifz al-mal*:

- Maximum leverage: 2–3× (not the 50–100× offered by most platforms).
- Mandatory stop-loss: maximum 10–15% drawdown from entry before automatic exit.
- Position sizing: maximum 5% of portfolio in any single perpetual position.
- Regular rebalancing: review position rationale monthly.

7.4 Intent Documentation (Niyyah)

Document trading intent before opening positions: the economic rationale (hedging, market-making, investment), the target asset, the risk parameters, and the exit criteria. This serves both Shariah discipline and practical risk management. A position opened without articulated rationale is more difficult to distinguish from speculative gambling (*maysir*) in retrospect.

7.5 Scholarly Consultation

This paper provides the structural analysis; it does not constitute a *fatwa*. Muslim traders and institutions should engage qualified Shariah scholars in their jurisdiction with this technical analysis as input. We particularly encourage engagement with AAOIFI and OIC Fiqh Academy on formal standard-setting for DEX derivative instruments.

8 Conclusion

The Islamic finance consensus that perpetual futures are prohibited is correct — for CEX perpetuals. The error across 57 reviewed sources is one of extrapolation: a correct *riba* diagnosis in one implementation was generalised to all implementations. That generalisation was defensible as long as all implementations shared the same formula; it is no longer defensible.

The interest parameter I in CEX funding formulas is demonstrable *riba* — predeter-

mined, independent of economic outcome, and labelled as interest in the platform's own API. That verdict stands for all platforms with $I > 0$ (Binance, Bybit, Hyperliquid). The interest parameter is, however, mathematically unnecessary: Ackerer et al. (2025) prove this, and dYdX v4 and D8X have operated successfully with $I = 0$ at scale. 365 days and 39,406 funding intervals confirm that the interest parameter — not exchange architecture — determines distributional structure: Hyperliquid (DEX, $I > 0$) behaves like CEX; dYdX v4 (DEX, $I = 0$) behaves differently. The Shariah verdict follows from reading the funding formula, with the distributional evidence serving as confirmation rather than free-standing proof. Applying El-Gamal's *riba* conditions, Kamali's standardisation criterion, Sole & Jobst's no-predetermined-return framework, and Salamon's *maysir* test yields a coherent verdict on premium-only DEX perpetuals used on productive underlying assets with disciplined risk management: *riba* absent by design; *gharar* substantially reduced by on-chain transparency; *maysir* use-contingent. Ownership (*qabdh*) and delivery-intent remain open for cash-settled synthetic perpetuals.

The practical implication: structural barriers to Muslim participation in this market are not inherent to the instrument class but arise from specific funding-formula design choices. Where $I = 0$, as in dYdX v4 and D8X, the *riba* basis for prohibition is removed — a replicable design criterion, not a platform-specific accident.

The reform implication is broader: perpetual futures can be structured to remove the *riba* component by design, and the empirical evidence is consistent with premium-only ($I = 0$) funding functioning at institutional scale across the 365-day sample analysed here. The remaining Shariah dimensions — ownership (*qabdh*), delivery-intent, and product-level *gharar* — are determinations for qualified scholars, to whom this paper supplies the technical foundation. We invite Islamic scholars, Shariah boards, and standard-setting bodies — particularly AAOIFI (whose Shari'ah Standards already address derivative and commodity contracts) and the OIC Fiqh Academy — to engage with the technical specifics of DEX funding formulas and develop formula-specific guidance for institutional participants.

Limitations and future research. Four limitations bound these results. The empirical sample covers a single 365-day window; multi-cycle data would strengthen external validity. The $I = 0$ specification on premium-only DEXs is governance-configurable rather than protocol-immutable, so compliance is a monitoring requirement, not a permanent guarantee. Oracle manipulation in price-feed computation is a residual *gharar* concern distinct from the funding formula and warrants separate analysis as the oracle ecosystem matures. And no recognised authority has yet issued a formal *fatwa* on DEX perpetuals; this paper supplies the technical foundation, not the jurisprudential ruling. The most important extension is 365-day operational data on the RWA-backed and DEX expiring-future structures on which the affirmative Shariah case rests.

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Declaration of generative AI use

During the preparation of this work, the authors used Claude Code (Anthropic) for copy-editing — specifically, correcting, formatting, and improving the clarity of the language and grammar of the authors' own original text. No AI tool was used to generate or draft new content. The authors reviewed and take full responsibility for all content in the published article.

Data availability

The funding rate dataset (39,406 unique intervals across four platforms, February 2025 – February 2026) used in this study is available at: https://doi.org/10.5281/zenodo.18817390 [dataset]. The raw dYdX v4 exports in the deposit additionally contain 88 exact duplicate records per asset from API pagination overlap; reported statistics use the deduplicated series.

Notes

[1] The 365-day window covers a predominantly bullish phase; a bear-period sample would likely show lower or negative annualised premiums on dYdX, while the CEX *riba* floor of 10.95%/year would persist unchanged.

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