Perpetual futures as complements to dated futures

Hyperliquid Policy Center

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About Hyperliquid Policy Center

Hyperliquid Policy Center (HPC) is an independent research and advocacy organization dedicated to advancing a clear, regulated path for Americans to access onchain markets.

HPC engages directly with policymakers, produces technical research, and champions practical regulatory frameworks for onchain markets, with deep expertise in perpetual futures and onchain financial infrastructure.

HPC's goal is to ensure that Americans can enjoy the benefits of onchain perpetual futures, an innovative product with the power to strengthen the U.S. economy and preserve U.S. leadership in global finance. Perpetual futures are the most widely traded derivative in digital asset markets, and a clear regulatory framework will expand product choice and attract new participants to our derivatives markets. Onchain markets offer more efficient, transparent, and resilient market infrastructure than their legacy counterparts, and the right regulations can bring those benefits to the United States.

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Abstract

This paper argues that perpetual futures markets expand hedging choice and improve price discovery, with no adverse effect on liquidity or volatility for dated futures markets. We demonstrate these findings through data from three distinct institutional settings: benchmark dated futures markets (CME), offshore centralized digital asset perpetuals markets (Binance and BitMEX), and offshore onchain digital asset and commodity perpetuals markets (Hyperliquid HIP-3). We test the following:

- Price discovery: whether perpetual prices bridge benchmark closures.
- Hedge value: whether simulated perpetual hedges reduce reopening exposure, net of funding and transaction costs.
- Incumbent harm: whether busier weekends for perpetuals are followed by worse CME reopening quality.
- Funding design: whether xyz:CL funding behaves more like anchoring around price discovery or untethered drift.

We find that in mature markets (e.g., BTC), Binance and BitMEX perpetuals strongly predict BTC reopening returns at the CME across our sample of 205 clean weekends. Simulated weekend hedges across the sample materially reduce reopening exposure. The same mechanism is at play in the HIP-3 commodity markets, where off-hours oil perpetual futures returns more closely track CME WTI reopenings, and simulated weekend hedges reduce hypothetical losses, albeit over a much smaller sample window. We find no robust evidence that perpetual futures activity degrades incumbent market quality. Our findings support the view that perpetuals markets should be evaluated as a differentiated product market that can expand hedging choice and improve price discovery.

1

Introduction

1 Introduction

Perpetual futures contracts (commonly referred to as "perps" or "perpetuals") are futures contracts of indefinite duration, allowing traders to maintain continuous exposure to an underlying reference asset. Rather than relying on expiration to anchor the contract price to the spot price of the underlying, perpetual futures use a funding rate mechanism to maintain price parity – longs pay shorts when the contract is trading above spot, and shorts pay longs when trading below.

As of November 2025, perpetual futures accounted for roughly 75% of all digital assets trading, with more than 90% of volume outside the United States.[1] Because the Commodity Futures Trading Commission ("CFTC") during the prior administration had taken the position in various enforcement actions that perpetuals constituted "swaps" (which would subject exchanges and market participants to more stringent regulation), perpetuals were generally only available on offshore exchanges.[2]

In May 2026, the CFTC reversed course, issuing an Order of Approval to Kalshi, a CFTC-registered designated contract market (DCM), for the listing of a bitcoin perpetual as a futures contract rather than a swap.[3] The Order's reasoning extends to similarly structured perpetuals referencing digital commodities with deep, active, and continuous spot markets, which remain eligible for self-certification under Regulation 40.2. In an accompanying Policy Statement, the Commission advised that perpetuals referencing asset classes outside that scope, including energy and agricultural products, be submitted for voluntary prior approval under Regulation 40.3, establishing case-by-case review for those products.[4]

The effort to bring perpetual futures onshore has reignited the debate over their risks. Skeptics argue that their introduction in U.S. markets could fragment liquidity and increase volatility. Our findings show that this may not be true, and that perpetual futures can expand hedging choice and improve price discovery.

This paper is structured as follows. Section 2 provides background on the derivatives market and highlights previous research relevant for our work. Section 3 gives an overview of the paper's analytical framework and data. Section 4 presents the results of our analysis. Finally, Section 5 covers policy implications and Section 6 concludes.

[1] See Reid Noch, Peter Haynes & Scott Baker, Perpetual Futures: The Missing Link in Tokenized Equities, TD Securities (Nov. 6, 2025), https://www.tdsecurities.com/ca/en/tokenized-equities-missing-link-perps (last visited Aug. 5, 2026).

[2] Under the Commodity Exchange Act, as amended by the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, only "eligible contract participants" may enter into swaps outside of a registered designated contract market or swap execution facility, and many standardized swaps must be traded and cleared on registered venues. See 7 U.S.C. § 2(e), (h)(1), (8).

[3] Order Approving KalshiEX LLC BTCPERP Futures Contract (CFTC May 29, 2026).

[4] Policy Statement Concerning the Listing of Perpetual Contracts, 91 Fed. Reg. 33,160 (June 3, 2026).

2

Background

2 Background

2.1 Market microstructure literature

Market-microstructure and financial economics research has long sought to understand how the introduction of new financial instruments affects the efficiency and resiliency of incumbent markets. Two major intellectual themes are present in the literature, which form the basis of our analytical approach in Section 3.

The first lens views liquidity and orderflow as fixed. This view argues that trading in financial markets is subject to positive network externalities, or "thick-market" effects. This means that traders congregate on venues with other traders and liquidity, which leads to self-reinforcing concentration. Pagano (1989) shows that market depth is a function of entry decisions made by traders, and a costless-to-enter market drifts toward single-venue concentration. Other research (Chowdhry and Nanda, 1991) has shown that markets with an initial advantage in captive order flow attract more discretionary liquidity traders, which then draws informed traders and reinforces venue dominance. For our research, the implications are clear: fragmentation works against positive externalities and network effects, widening spreads and degrading execution efficiency. If this lens accurately describes the futures markets before and after the introduction of perpetual futures, we should see deterioration in incumbent (i.e., CME) market quality following their introduction.

The second lens looks at the addition of new contracts in the context of market completeness. Duffie and Rahi (1995) survey the literature on financial innovation and security design and postulates that designing new financial instruments is primarily an exercise in balancing risk transfer, information revelation, liquidity, and incentives. Adding a new instrument to the market allows investors to hedge risks that were previously unhedgeable and can improve overall market welfare by transferring risk to those willing to bear it. This view is further supported by seminal work (Merton, 1995) on the functional perspective, which says that financial innovation should be understood in terms of the economic functions it performs, rather than the specific institutions or instruments through which a function is delivered. In the context of perpetual futures and dated futures, both may perform the core function of transferring price risk, but they do so through different instrument designs that appeal to heterogeneous classes of market participants facing different constraints (e.g., trading horizons, funding needs, operational capabilities, venue access, etc.). Perpetual futures, therefore, may complement dated futures rather than displace them by expanding the set of market participants that are able to hedge efficiently.

2.1.1 Perpetual futures: origins and the funding-anchoring question

Futures contracts without a maturity date predate modern digital asset markets by decades. In the early 1980s, for example, the Chinese Gold and Silver Exchange Society of Hong Kong offered gold contracts that could be deferred indefinitely from day to day, with an interest payment between longs and shorts set at a daily fixing, an early analogue of the modern funding rate (Gehr, 1988).[5] In the early 1990s, work by Nobel laureate Robert Shiller formalized the concept academically, proposing a non-expiring futures contract designed for hedging long-term macroeconomic risks (e.g., housing, labor costs, etc.) that were poorly served by dated futures due to a lack of an observable spot price (Shiller, 1993). His theoretical specification was for a cash-settled instrument with payments derived from the underlying asset's cash flows (e.g., rent or dividends). One of the most robust implementations of perpetuals was introduced by BitMEX in 2016 and provided non-expiring leveraged exposure to an observable underlying spot price using a funding rate that is periodically exchanged between long and short positions. As described in Ackerer et al. (2026), the funding-rate mechanism creates the exact arbitrage conditions that induce convergence between spot and perpetuals prices and serves as an anchoring mechanism so perpetual futures prices come back to spot prices.

[5] U.S. securities exchanges also experimented with a form of indefinite equity instrument in the 1980s. In 1989, several securities exchanges listed "index participations," cash-settled instruments of indefinite duration referencing the value of a stock-index basket. The Seventh Circuit, at the CME's urging, held that index participations were futures contracts within the CFTC's exclusive jurisdiction, and the products were subsequently delisted. *Chicago Mercantile Exchange v. SEC*, 883 F.2d 537 (7th Cir. 1989).

2.1.2 Price discovery and off-hours trading

Our empirical design is not intended to identify which trading venues or products lead price discovery. Instead, we draw on the literature to ground our examination of how weekend offshore perpetual futures prices predict CME reopening returns. Alexander et al. (2020) use Hasbrouck (1995) information shares and Gonzalo and Granger (1995) component shares to analyze the price-discovery dynamics between perpetuals on BitMEX and a number of spot exchanges (Coinbase Pro, Bitstamp, and Kraken). They find that BitMEX perpetuals prices lead spot price discovery on major international exchanges and are an effective way to hedge spot price volatility.

In addition, there is a body of research on trading around market closures that further supports our analysis of how weekend offshore perpetuals prices incorporate information that is subsequently reflected in the CME reopen. For example, Barclay and Hendershott (2003) demonstrate that, despite meaningfully lower volumes, price discovery continues to happen outside regular trading hours. While after-hours prices are less efficient, they also find that individual after-hours trades are more informative as there tends to be a higher concentration of informed traders when the main session is closed.

2.1.3 Policy and regulatory context

These issues have increasing policy relevance. In April 2025, the CFTC issued Requests for Comment on 24/7 trading and on the trading and clearing of “perpetual style” derivatives.[6] The latter specifically asked whether perpetual futures provide commercial hedging value and if they should be classified as futures or swaps. In 2026, the CFTC issued an Order of Approval to Kalshi to list a BTC perpetual futures contract as a futures contract under Section 5c(c)(4) of the Commodity Exchange Act.[7] Prior to this approval, only “perpetual style” futures were available in the United States, which were effectively dated futures contracts with extremely long tenors.

The Kalshi Order’s analysis was limited to the bitcoin contract before the Commission and to similarly structured perpetuals referencing digital commodities with deep, active, and continuous spot-market trading. In the accompanying Policy Statement, the Commission made clear that perpetual contracts referencing other asset classes, including energy and agricultural products, would be evaluated on their own terms. The Commission has since followed up with a request for comment on the extension of standard futures contracts to 24/7 trading and on perpetual contracts referencing physically delivered or storable energy commodities such as crude oil, examining several topics, including: reference price reliability and manipulation resistance, surveillance and operational readiness, position limits, margin and clearing, customer protection, and effects on the underlying physical markets and the commercial participants that rely on them.[8]

2.1.4 The fixed cost structure of hedging

Hedging using dated futures carries substantial fixed costs that are regressive in relation to firm size. For example, a commercial hedger using the existing dated market needs, at a minimum: (i) a formal relationship with a futures commission merchant (FCM), which may be uneconomical for most FCMs to provide at smaller volumes; (ii) operational policies and procedures for managing margin workflows; (iii) exposure large enough to be expressable in standard-size contract units; and (iv) someone experienced in financial risk management who can manage the roll calendar. These costs are borne by the hedger whether they are managing \$200,000 in exposure or \$200 million.

This is not merely a theoretical concern. Academic literature on who uses derivatives (Nance et al. (1993); and Géczy et al. (1997)) has consistently found that firm size is highly predictive of derivatives use. Survey

[6]Press Release, Commodity Futures Trading Comm’n, CFTC Staff Seek Public Comment on 24/7 Trading (Apr. 21, 2025), `https://www.cftc.gov/PressRoom/PressReleases/9068-25`; Press Release, Commodity Futures Trading Comm’n, CFTC Staff Seek Public Comment Regarding Perpetual Contracts in Derivatives Markets (Apr. 21, 2025), `https://www.cftc.gov/PressRoom/PressReleases/9069-25.`

[7]See Press Release, CFTC Approves BTCPERP Contract Submitted by KalshiEX, LLC (May 29, 2026), `https://www.cftc.gov/PressRoom/PressReleases/9240-26.`

[8]See Press Release, CFTC Seeks Public Comment on the Extension of Standard Futures Contracts to 24/7 Trading and on Perpetual Contracts Referencing Physically Delivered or Storable Energy Commodities (June 22, 2026).`https://www.cftc.gov/PressRoom/PressReleases/9259-26.`

evidence summarized by Bodnar et al. (1995) attributes this to economies of scale in the costs of managing a hedging program. In our review, we found no literature that would support the notion that smaller firms would be less exposed to the types of risk that could be managed by hedging. In fact, it is plausible that smaller firms, which are less diversified and tend to have more limited capital, would benefit greatly from risk-transfer products.

2.1.5 Access as a function of ticket size

Contract size plays an important role in determining who can reasonably access an instrument. For the WTI benchmark contract on CME, the contract unit is 1,000 barrels, which would be roughly $70,000 notional per contract as of July 2026 prices.[9] The benchmark BTC contract on CME is 5 BTC, or over $300,000 notional as of July 2026.[10] Commercial hedgers with exposures below or between contract multiples are forced to either over-hedge, under-hedge, or avoid hedging entirely.

A stylized example is instructive. Consider a regional fuel distributor carrying an average inventory of 600 barrels of oil or oil-related exposure. Using the CME WTI benchmark contract, their option would be zero contracts (i.e., unhedged) or one contract (i.e., 167% hedged). In the hedging scenario, fully one-third of the position is now a speculative, directional bet that is unrelated to risk-transfer function. By their own actions, exchanges like CME concede this is a problem and have introduced multiple "micro" contracts of smaller denominations. However, while the micro contracts help address the contract-granularity issue, they add to market complexity and inefficiency by fragmenting liquidity across additional contract ladders where small hedgers pay theoretically higher all-in costs in exchange for smaller-sized contracts. Perpetual futures have no standard contract size and typically trade on a single order book, so 600 barrels can be hedged using the same liquidity pool as everyone else.

2.1.6 Access as a function of the calendar

Market hours are another factor. In February 2026, disruptions in the Strait of Hormuz caused significant repricing and market volatility, some of which occurred over the weekend. For participants whose only trading venue was the New York Mercantile Exchange (NYMEX), weekend moves could not be acted on until the reopening. At this point, the entire market was repriced in a single large print. Large, multinational trading houses can effectively hedge this risk through offsetting exposures and OTC relationships, but smaller domestic and international industrial producers do not have the same tools at their disposal. Perpetual futures that are available 24/7 convert forced-exposure windows (i.e., off-hours periods) into normal trading windows that provide around-the-clock hedging utility.

2.1.7 Operational simplicity

The final fixed-cost component comes from having to continuously roll contracts as they get close to expiry, an unavoidable requirement across even a medium-term time horizon. Each roll requires closing the expiring contract and opening a new position in a later maturity, crossing the calendar spread, and determining the optimal timing within the roll window. The operational and strategic complexity that makes up roll risk is effectively absent in perpetual futures.

A commercial hedger who hedges a one-year exposure using monthly contracts must execute twelve round-trip rolls in a year. Each roll incurs venue fees twice, once when the expiring position is closed and again when the position is reestablished in the next maturity, so a monthly cadence generates twenty-four fee-bearing executions per year. Assuming even a conservative all-in cost of a few basis points per roll (inclusive of the calendar spread paid or realized between the expiring and new contracts, i.e., the profit or loss on the roll itself), the annual drag could reach into the tens of basis points on notional. These figures also exclude the operational costs of managing the roll calendar itself, including the man-hours and overhead

[9] See Crude Oil Overview, CME Grp., `https://www.cmegroup.com/markets/energy/crude-oil/light-sweet-crude.html` (last visited Aug. 2, 2026).

[10] See Bitcoin Futures - Contract Specs, CME Grp., `https://www.cmegroup.com/markets/cryptocurrencies/bitcoin/bitcoin/specs#tradeDate=20260729` (last visited July 30, 2026).

of a risk-management function that must track roll windows, time executions, and reconcile positions across maturities, along with any tail risk associated with a poorly executed roll.

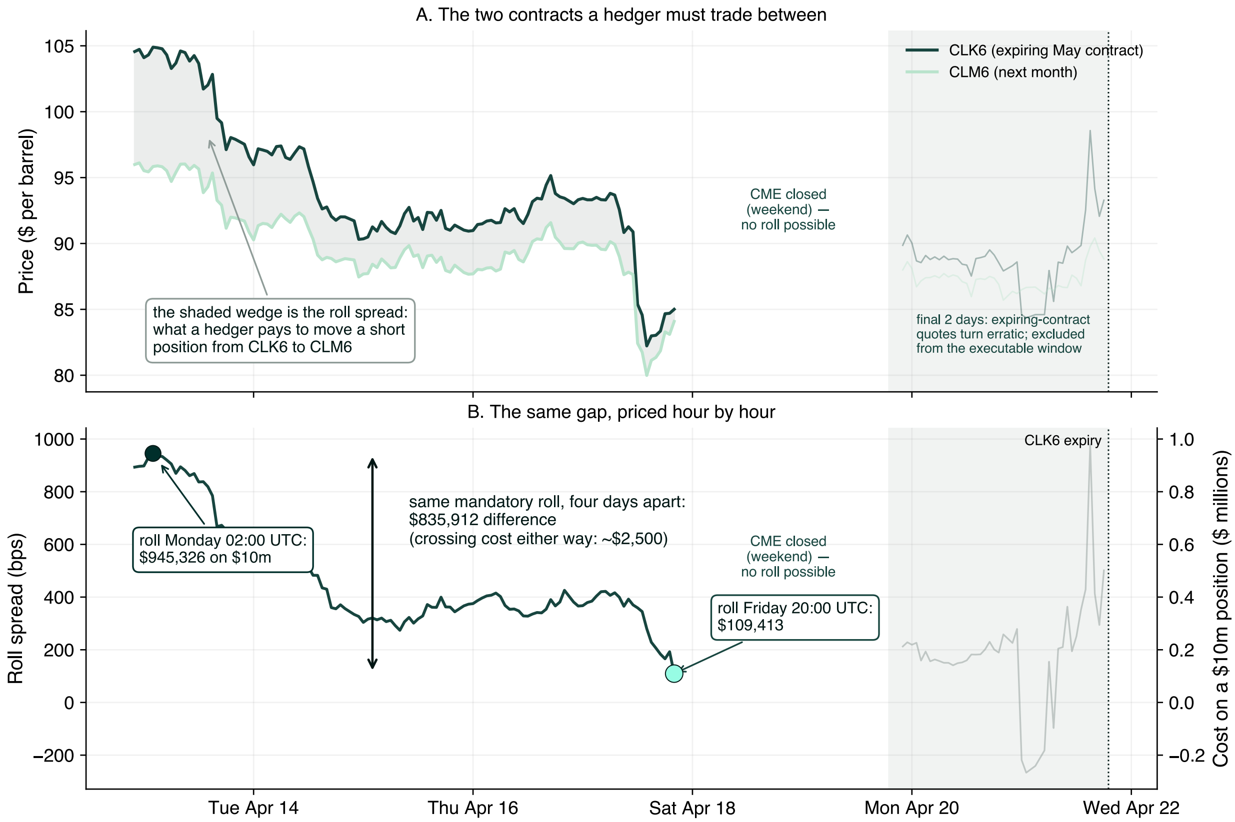


Figure 1: Roll timing worked example, April 2026

Using a dated futures contract to hedge over a multi-month period requires rolling the contract. Every month, the hedger must move the position from the expiring contract to the next one, within a fixed window, at whatever is the prevailing calendar spread. Mechanically, crossing the spread is inexpensive (e.g., $2,500 on $10 million notional). The true cost is a function of timing, which we can see in Figure 1 in a worked example using the April 2026 roll.

Executing the roll on Monday, April 13 at 2:00 UTC would cost roughly $950,000, while an identical transaction completed on Friday, April 17 at 20:00 UTC costs roughly $110,000. A perpetual futures trader never has to make this transaction to maintain a hedge.

3

Analytical Framework

3 Analytical framework

As previewed in Section 2, our analytical approach utilizes two lenses. The first frame assumes that there is a fixed pool of demand (e.g., liquidity) for derivative instruments, so any additional products necessarily take volume from existing markets. Under this assumption, product variety is bad, particularly for commercial hedgers, insofar as it leads to fragmentation, which reduces market depth and widens spreads. Product expansion under a fixed-pool world should lead to substitution and market quality deterioration.

In fixed-pool conditions, perpetual futures activity should be a *substitute* for incumbent activity (as opposed to being additive) when incumbent markets are unavailable. We test this by looking at whether incumbent activities rise or fall following major offshore perpetual futures events. We would also expect increased perpetual futures activity to be followed by worse incumbent market quality, which we measure by testing whether busier perpetual futures trading weekends predict a wider CME-perpetual basis or slower price stabilization at the open. Finally, if perpetual futures prices diverge from the underlying benchmark while incumbent markets are closed, the divergence should be characterized by untethered drift or noise, rather than price discovery. We test this by examining whether off-hours moves predict the open and by analyzing the behavior of the perpetual futures market funding rate.

As a separate, contrasting frame, we assume that derivatives markets are not characterized by a fixed pool of demand/liquidity, but rather that new contracts or products expand the set of strategies, participant types, position sizes, and trade times that are feasible in a market. We test this by looking at four things.

- **Closure coverage**: Perpetual futures trade while the incumbent futures market is closed, so market participants have the ability to manage risk exposure rather than waiting for the benchmark to reopen. Markets also have the ability to discover prices while perpetual futures trade continuously.
- **Non-expiring exposure**: Perpetual futures maintain exposure without mandatory contract rolls. Commercial hedgers who maintain positions over a medium or long time horizon must repeatedly close the expiring contract and open a new one, incurring round-trip transaction costs (including roll-timing risk). Perpetual futures remove these structural frictions, which are particularly hard to manage for smaller entities.
- **Smaller-ticket access**: Perpetual futures have no fixed or standardized contract sizes, allowing for improved access for new participants and participants for whom the incumbent market size is too large.
- **Venue diversity**: Having multiple venues providing risk-transfer products is generally good for market resiliency as the failure of one venue does not eliminate the ability to transfer risk.

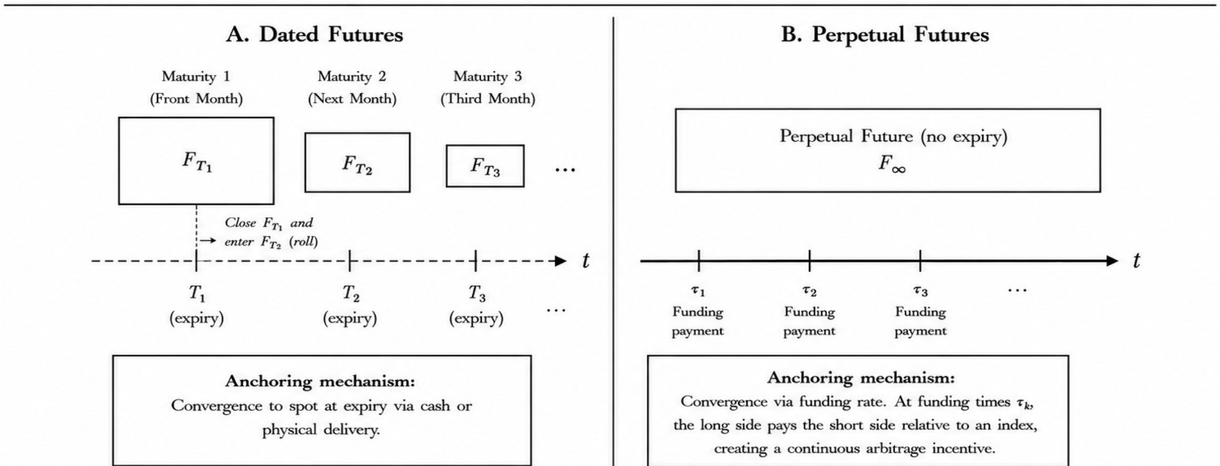
The results are intended to be read collectively as a ladder of evidence in support of the claim that the perpetual futures market is beneficial for market participants and broader financial system welfare.

3.1 Institutional setting

3.1.1 Dated futures vs. perpetual futures

This paper is concerned with two types of derivatives contracts: dated futures and perpetual futures. Both designs function as risk-transfer contracts with different mechanisms for anchoring the derivative price to its underlying spot price. Dated futures contracts guarantee this by forcing convergence through cash settlement or physical delivery at contract expiry. As a result, dated futures contracts have finite exposure across time (hence the need to roll) and liquidity is fragmented across contracts of different maturities. Perpetual futures anchor their price to the underlying through the funding rate mechanism where, at fixed intervals, the long side of the market relative to an index price pays the short side, which creates a continuous arbitrage incentive.[11] Since there is only one contract (i.e., there is no "series" of contracts spread across a maturity ladder), liquidity is concentrated and there is no minimum contract size. Figure 2 compares and contrasts the two.

[11] For example, if the perpetual future trades at a premium relative to the index, funding transfers from longs to shorts, which creates an incentive for arbitrageurs to short the perpetual (pulling down its price) and buy the spot asset (pushing up its price) driving convergence in the basis.



Anchoring mechanism	Convergence to spot at expiry via cash or physical delivery.	Convergence via funding rate. At funding times τ_k, the long side pays the short side (or vice versa) relative to an index, creating a continuous arbitrage incentive.
Time exposure	Finite. Exposure ends at expiry; maintaining a position requires rolling into a new maturity.	Infinite (no expiry). Position can be maintained without roll-related interruption.
Liquidity structure	Fragmented across contracts with a maturity ladder. Liquidity is typically highest in the front month and declines with maturity.	Concentrated in a single contract (no maturity ladder), creating deeper, more continuous liquidity.
Contract granularity	Minimum contract size imposed by the exchange.	No minimum contract size.

Notes: F_{T_i} denotes the price of a dated futures contract expiring at time T_i. F_∞ denotes the price of the perpetual futures contract. τ_k denotes funding times at fixed intervals (e.g., every 8 hours).

Figure 2: Comparison of Dated futures and Perpetual Futures

3.1.2 Chicago Mercantile Exchange (CME)

The CME WTI contract (NYMEX CL) is structured in 1,000-barrel units and is physically deliverable at Cushing, OK. As the global benchmark for crude, it trades 23 hours per day Sunday through Friday with no trading over the weekend. CME introduced cash-settled BTC futures in December 2017 in 5-BTC units, which settle based on the CME CF Bitcoin Reference Rate. In 2021, CME introduced micro-BTC futures in 0.1 BTC units (which are out of scope for this report). From 2017 through May 2026, CME's digital asset futures market closed Friday afternoon and reopened Sunday evening.

3.1.3 Binance and BitMEX

BitMEX introduced the first digital asset perpetual future in 2016 with XBTUSD, an inverse, BTC-margined contract with an 8-hour funding rate interval.[12] Binance launched its USDT-margined perpetual futures contract in 2019 and is today the dominant global instrument processing approximately $25.4 trillion in volume in 2025.[13] Both venues have traded continuously since their inception and were open during every CME weekend closure in our sample window.

3.1.4 HIP-3 perpetual futures

Hyperliquid is a general-purpose Layer-1 blockchain that supports fully onchain financial activity, with all transactions verified and recorded directly on the blockchain itself. The Hyperliquid blockchain has two separate (but connected) execution environments: HyperCore and HyperEVM. HyperCore contains a small number of financial primitives that are optimized for high-frequency, low-latency trading. HyperEVM is a general-purpose programming environment based on the Ethereum Virtual Machine (EVM). By analogy, HyperCore is like a GPU (rigid and optimized for speed within a narrow set of tasks) and HyperEVM is like a CPU (comparatively slow but extensible enough to handle almost any computational task). Hyperliquid's design optimizations mean that Hyperliquid can operate a true central limit-order book (CLOB) entirely onchain.

In October 2025, the Hyperliquid network adopted Hyperliquid Improvement Proposal 3 ("HIP-3"), a protocol-level update that allows independent builders to permissionlessly deploy perpetual futures markets on the network.[14] Deployers that stake 500,000 HYPE (the native token of the Hyperliquid network) may define the market's parameters (including oracle reference, margin requirements, and certain funding parameters). As an embedded market integrity and risk management function, deployers may face penalties for market operation that jeopardizes protocol correctness, uptime, or performance. In 2026, oil and precious metals (i.e., gold and silver) markets deployed by TradeXYZ, a third-party platform, became dominant by volume in HIP-3 markets overall.[15]

The TradeXYZ WTIOIL (xyz:CL) perpetual future is a cash-settled HIP-3 contract. Its funding rate references the front-month CME WTI futures contract when the benchmark market is open (23/5) and uses an internal exponential-moving average (EMA) mechanism during the weekend and evening off-hours periods. Funding payments are settled every hour.[16] We test whether this is effective later in this report.[17]

[12] See XBTUSD: Contract Specification, BitMEX, https://www.bitmex.com/app/contract/XBTUSD?__hstc=172477884.e766fa1fa02bf22faeff272db118f2dd.1531353600111.1531353600112.1531353600113.1&__hssc=172477884.1.1531353600114&__hsfp=1773666937 (last visited July 30, 2026).

[13] Leverage and Derivatives: Overview of Binance Futures in 2019, Binance Blog (Jan. 16, 2020), https://www.binance.com/en/blog/all/421499824684900356; Futures Frenzy Pushed Crypto Exchange Volume to Nearly $80 Trillion in 2025, NewsBTC (TradingView), https://www.tradingview.com/news/newsbtc:6f8ed7308094b:0-futures-frenzy-pushed-crypto-exchange-volume-to-nearly-80-trillion-in-2025 (last visited Aug. 2, 2026).

[14] HIP-3: Builder-deployed perpetuals, Hyperliquid, https://hyperliquid.gitbook.io/hyperliquid-docs/hyperliquid-improvement-proposals-hips/hip-3-builder-deployed-perpetuals (last visited July 30, 2026).

[15] See Lilian Aliaga & Maximilien Prué, What is Hyperliquid's HIP-3? How it works and use cases, Hyperliquid (June 25, 2026), https://oakresearch.io/en/analyses/innovations/what-is-hyperliquid-hip-3-how-it-works-and-use-cases.

[16] Commodities, Trade[XYZ], https://docs.trade.xyz/asset-directory/commodities (last visited Aug. 2, 2026); Funding, Trade[XYZ], https://docs.trade.xyz/perp-mechanics/funding (last visited July 30, 2026).

[17] Note: BTC perpetual futures also trade on Hyperliquid under the ticker BTCUSD. These perpetuals are not HIP-3 deployed.

3.2 Data

Our design uses continuous perpetual futures prices with benchmark closure boundaries. The unit of observation is the "clean weekend," which we define as a matched close-to-reopen interval anchored by the CME's Friday 5pm ET close and Sunday 6pm ET reopen. Weekends are admitted into the sample only if both benchmark boundary prices are within 15 minutes of the expected close and reopen. This process yields 205 clean weekends per venue for BTC (CME, Binance, and BitMEX) and 19 clean weekends for oil (xyz:CL and CME WTI).

3.2.1 Perpetual futures venues

- Binance and BitMEX BTC: Minute-level price and contract volume for BTC/USDT (Binance, linear) and XBTUSD (BitMEX, inverse), 2021-2026, with observed BitMEX funding from the public funding API.
- Hyperliquid xyz:CL (HIP-3) and BTCUSD (via Hyper Foundation S3 archive): Hourly OHLCV candles starting January 7, 2026, plus funding rate history; notional activity calculated as hourly base volume multiplied by hourly close; 10-minute windows of finalized trades, used for trade-size analysis.

3.2.2 Benchmark and regulatory data

- CME commodities (via Databento): One-minute best-bid/offer data for CL (plus ZC and ZW for diff-in-diff analysis), which is used to create a benchmark price at the closure boundaries and build reopen quality measures (e.g., first-30-minute spread and stabilization).
- CME BTC (via Databento): Minute-level price and contract volume for full-size contract from 2021-2026.
- CFTC Commitments of Traders report: Market participation across markets (CME) across our sample window.

4

Results

4 Results

We present the results of our analysis as a ladder of evidence as previewed in Section 3. First, we consider whether off-hours perpetual futures prices carry useful price-forecast information and if that information is economically usable by market participants. Next, we consider whether there are adverse effects on the incumbent market (i.e., CME) and if the funding mechanism and participant base are consistent with the market-expansion hypothesis.

4.1 Closure bridging and hedge value

Of particular interest for our analysis is understanding how the perpetual futures price behaves (and what explains its movements) when the benchmark market is closed.

4.1.1 BTC perpetual returns bridge CME closures

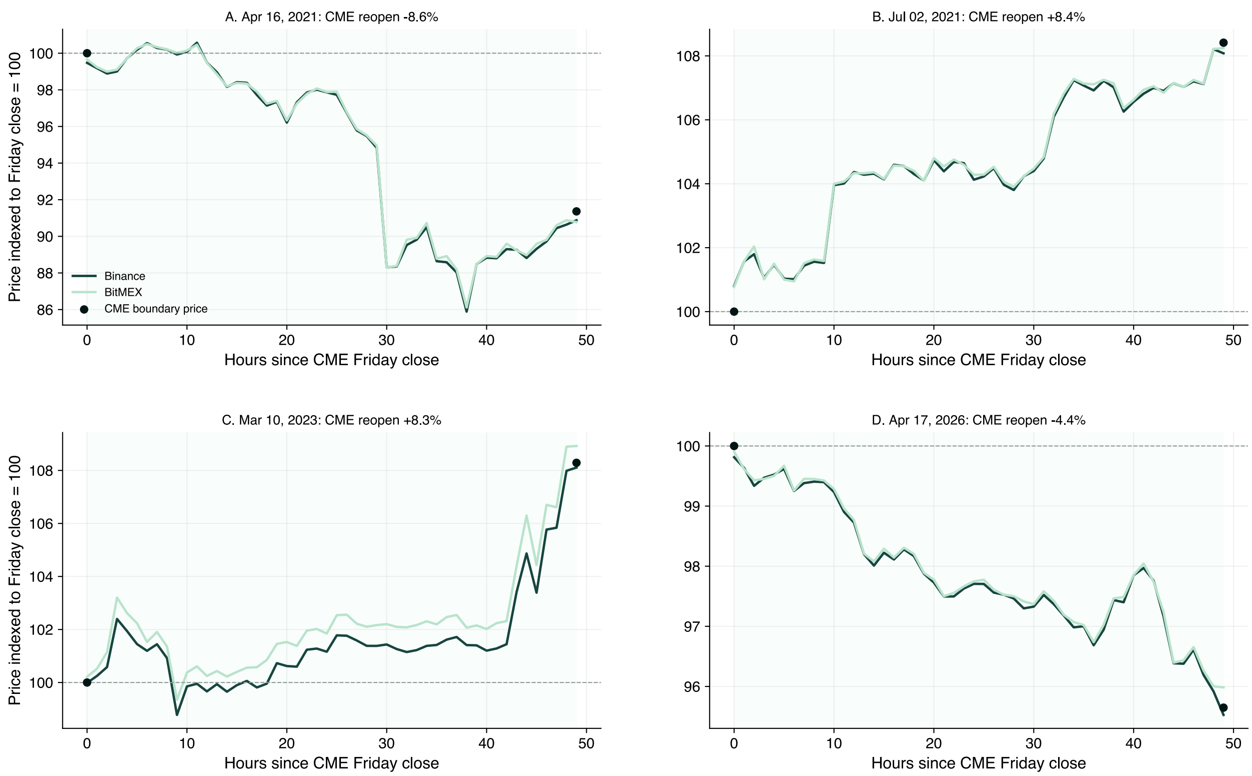


Figure 3: BTC Price Path over Four Select Weekends

Figure 3 shows the price paths for BTC futures on select weekends. Each panel shows a weekend when CME BTC futures were closed while the perpetual futures market continued to trade. During CME closures, prices continue to move. When CME reopens, the benchmark price validates most of the off-hour moves.

Table 1 presents the results of a closure-bridge regression where, for weekend i and venue v, the specification is:

$$r_i^{\text{CME}} = \alpha_v + \beta_v \, r_i^{\text{perp}} + \varepsilon_i \tag{1}$$

where r_i^{CME} is the benchmark close-to-reopen log return and r_i^{perp} is the perpetual log return over the same benchmark-closed interval. For each regression, the coefficient (β_v) estimates how much the off-hours perpetual futures move is associated with the later benchmark reopening move. A slope of one means the continuously-traded perpetual future converges to the benchmark reopening once the weekend ends. Conversely, a slope of zero means that the off-hours move was not at all predictive of the reopen.[18]

Table 1: Closure-Bridge Regressions

Model	Dependent variable	Perpetual futures closed-hours return	HC1 robust SE	p-value	N	R2
BTC / Binance	CME close-to-reopen return	1.0019***	0.0071	<0.001	205	0.994
BTC / BitMEX	CME close-to-reopen return	0.9989***	0.0099	<0.001	205	0.990
BTC / BTCUSD (Hyperliquid)	CME close-to-reopen return	0.8488***	0.0848	<0.001	18	0.811
xyz:CL	CME close-to-reopen return	1.0729***	0.0726	<0.001	19	0.879

Binance and BitMEX BTC perpetual futures weekend trading returns map almost one-for-one into CME reopening prices (Binance 1.0019, BitMEX 0.9989) across 205 clean weekends, with the perpetual return explaining roughly 99% of the variance in the CME reopening return (R-squared 0.994 and 0.990). Hyperliquid estimates show the same pattern for BTCUSD and xyz:CL (0.8488 and 1.0729), with similar precision across 18 and 19 clean weekends.

4.1.2 xyz:CL improves the WTI reopening forecast

The BTC sample in 4.1.1 establishes the mechanism with statistical power. The more policy-relevant question is whether the same dynamic carries over to the physical commodity setting. Figure 4 Panel A plots the off-hours xyz:CL weekend return against the subsequent CME WTI close to reopen return with a fitted regression slope. Over 19 clean weekends, we measured a correlation of 0.938 and a slope of 1.07 (also reported in Table 1). As a robustness measure, we also conduct a leave-one-weekend-out check that estimates the relationship by dropping each weekend in turn, where we calculate a minimum correlation of 0.88, so we are reasonably confident that these results are not driven by one or two extreme weekends.

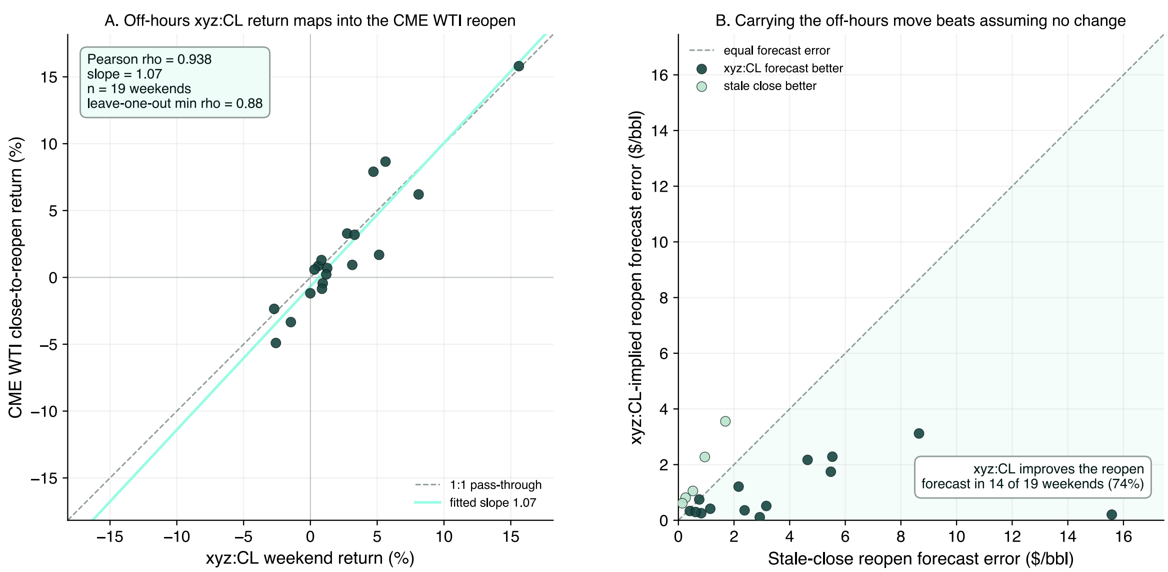


Figure 4: xyz:CL Reopening Metrics

[18]Note on design: Our approach uses final historical timestamps that are matched to close-to-reopen windows. It shows that off-hours perpetual futures trading contains information about the reopen, but it does not show evidence of transaction-level price leadership at high frequency, given data constraints.

Panel B of Figure 4 plots the xyz:CL implied reopening forecast error against the naive forecast that assumes the benchmark opens at its stale closing price. Points below the 45-degree line are weekends where xyz:CL gave a more-accurate read on the reopen. In 74% of clean weekends, the xyz:CL implied forecast has a smaller absolute error. This means that the perpetual would have given a commercial hedger a better read on the opening compared to doing nothing.

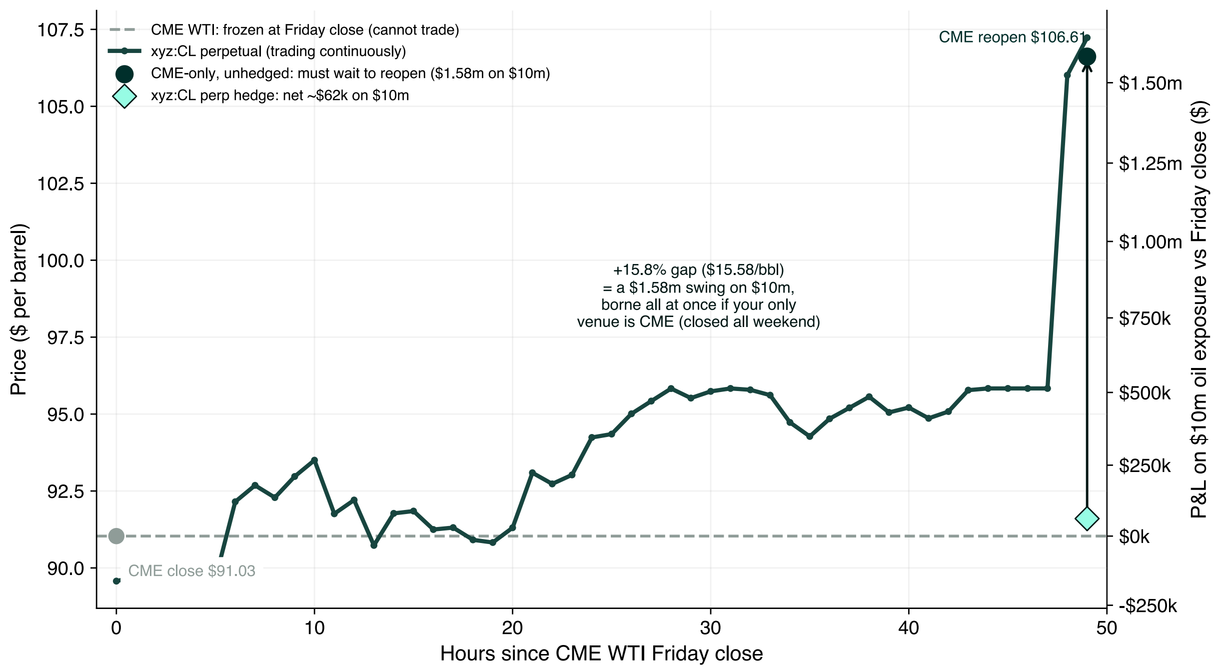


Figure 5: xyz:CL Closure Bridge Example, March 2026

The importance of these dynamics is particularly visible during a high-volatility weekend, as shown in Figure 5, which displays the largest weekend move for CME WTI in our sample. At the start of the weekend of March 6, 2026, the benchmark closed at $91.03. Over the following roughly 49 hours, the xyz:CL traded continuously until it hit the weekend boundary at approximately $107. When CME reopened on Sunday, WTI traded at $106.61, a 15.8% gap that landed on any unhedged position all at once at the reopen. For the long side, this would have been a windfall of $1.58 million per $10 million, and a mark-to-market loss of the same size for the short side, with neither side able to adjust while the benchmark was closed. In the next section, we present a worked example showing how an opposite-side oil-perpetuals hedge during that weekend would have collapsed that exposure.

4.1.3 Simulated pre-positioned hedges reduce reopening exposure

Price discovery is useful only if participants have the ability to act on it. Therefore, we ask next whether the off-hours information documented above is economically valuable by considering whether a simulated perpetuals hedge, net of costs, would have reduced the exposure faced by a commercial hedger. Consider an airline that knows it must buy millions of gallons of jet fuel next month. If oil jumps 15% over the weekend, every gallon it needs now costs 15% more, so its fuel bill has effectively risen by that amount, and because the benchmark market is closed, the airline absorbs the entire increase at once at the reopen rather than managing the risk as prices move.

Figure 6 plots losses against weekend moves for a fixed $10 million exposure. Panel A plots the losses for each of the 19 clean weekends in our sample. The gray line shows the weekend move scaled by the $10 million, which is the unhedged loss a trader would have faced. [19] The green dots are the final hedged loss

[19] Throughout, "loss" is shorthand for absolute reopening exposure, i.e., whether a given weekend's move is realized as a gain

for each weekend net of a 10 bps cost factor that we include to incorporate transaction costs associated with executing the hedge. Moving from left to right on the x-axis, we can see that hedged losses stay tight around the axis as the size of the weekend move grows.

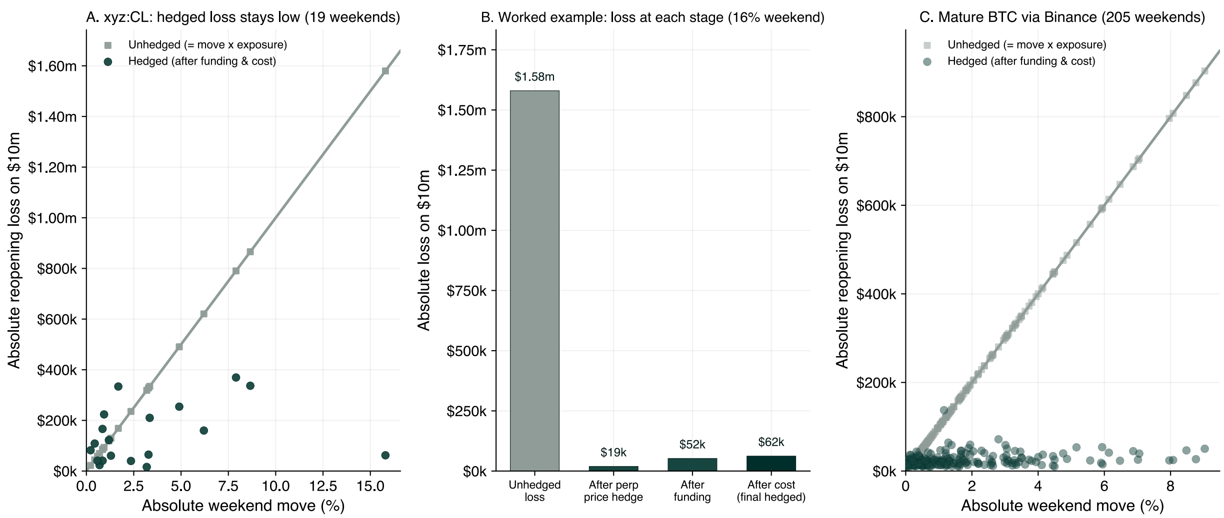


Figure 6: Hedge Value as Loss Versus Exposure

Panel B shows the loss on a $10 million exposure for the weekend of March 6, 2026 when the benchmark reopened 16% higher than its Friday price at close. For completeness, we also include funding costs and transaction costs here. The data reveal that hedging with xyz:CL perpetual futures would have reduced exposure from $1.58 million to $19,000, which only increases to $62,000 total after factoring in funding (observed) and transaction costs.

Panel C is a robustness check that runs the same analysis as Panel A using data from Binance BTC perpetual futures across 205 clean weekends. Regardless of the size of the weekend move, hedged losses remain low.

Table 2 presents stacked-pair regression results by venue and market where each clean weekend contributes two stacked rows:

$$\left|\text{loss}\right|_i \;=\; \alpha \;+\; \beta\, 1\{\text{hedged}\}_i \;+\; \varepsilon_i \tag{2}$$

where hedged = 0 is the absolute CME reopening loss and hedged = 1 is the absolute residual loss after the simulated perpetual hedge, net of modeled funding and transaction cost where available. A negative coefficient means that the simulated hedge, on average, lowers absolute reopening exposure. Another way of thinking about the coefficient is that it is the average change in absolute reopening loss from moving an observation from unhedged to hedged. The estimates are negative and highly statistically significant for Binance and BitMEX BTC markets. xyz:CL is negative, economically large, and moderately statistically significant, while Hyperliquid BTCUSD perpetuals estimates are also negative with less statistical power.

A single specification can drive specious results, so we stress the hedge result from Table 2 in the Appendix.

or a loss depends on the sign of the position, and the absolute-value metric deliberately scores both sides' unmanaged risk symmetrically.

Table 2: Hedge-Loss Regressions

Model	Dependent variable	Hedged indicator	Cluster-robust SE	p-value	N	R2
xyz:CL	Absolute reopening loss	-0.0196**	0.0088	0.039	38	0.108
BTC via Binance	Absolute reopening loss	-0.0154***	0.0013	<0.001	410	0.247
BTC via BitMEX	Absolute reopening loss	-0.0148***	0.0013	<0.001	410	0.233
BTC via Hyperliquid	Absolute reopening loss	-0.0085*	0.0045	0.080	36	0.120

4.2 Incumbent-market reopening quality

4.2.1 Weekend perpetual activity and reopening outcomes

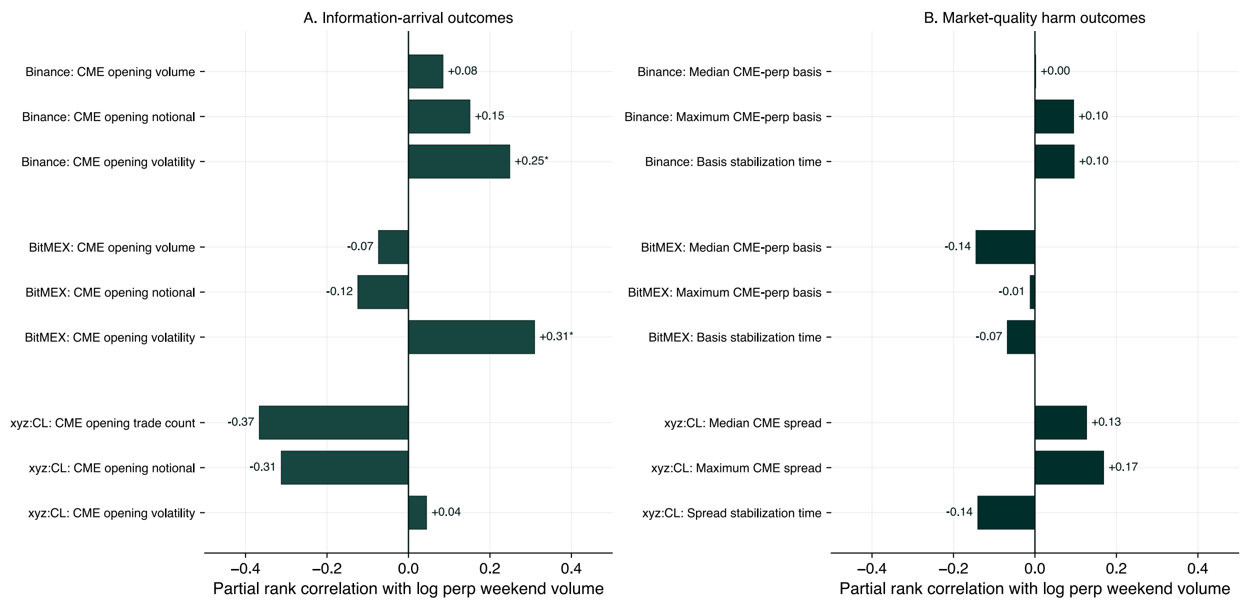


Figure 7: Perpetual Futures Impact on Reopening Quality

So far, the evidence presented comports with the market-expansion hypothesis, namely that perpetual futures are additive to the overall market by providing additional ways for traders to express risk. Next, we test the fixed-pool lens and consider whether perpetual futures harm incumbent markets, with the results presented in Figure 7. Figure 7 separates information-arrival outcomes from market-quality harm outcomes and looks at the partial-rank correlation of log perpetual weekend volume with each outcome, controlling for the absolute weekend move. In general, perpetual futures trading is associated with some information-rich opening outcomes, especially volatility. Basis and stabilization metrics do not show robust adverse effects. The BTC harm measures in Panel B use the CME-perpetual basis, while oil uses CME bid-ask spreads. Information arrival shows a stronger statistical relationship, particularly for BTC volatility. There are no statistically significant relationships for xyz:CL across either the information-arrival or harm measures.[20]

4.2.2 Post-launch WTI reopenings versus a historical conditional benchmark

The partial-rank correlations above are associative, while cross-commodity comparisons depend on the comparability of the selected control markets. We therefore supplement them with a design that stays entirely within WTI. The question is deliberately conditional: given the magnitude of the realized weekend price

[20]Bars report partial Spearman rank correlations between log perpetual weekend volume and the indicated CME reopening outcome, controlling for the absolute CME close-to-reopen return. BTC estimates use 205 clean weekends for Binance and BitMEX; xyz:CL estimates use 19 clean weekends.

shock and the market's condition before the Friday close, did CME WTI reopen more poorly after the xyz:CL launch than WTI's own pre-launch history would predict?

The design controls for the fact that large weekend moves mechanically produce wider and slower reopenings on any venue. A simple before-and-after comparison of reopening quality would therefore conflate the effect of the xyz:CL launch with the fact that the post-launch period happened to contain unusually large moves. Instead, we use pre-launch history to learn the normal relationship between the size of a weekend move and the quality of the CME reopening that follows, and then ask whether each post-launch weekend reopened better or worse than that historical relationship predicts for a move of its size. A reopening that is no worse than history predicts is evidence against the fragmentation concern.

For each reopening outcome k, we estimate on 73 pre-launch weekends (June 2024 through early January 2026) a deliberately small set of candidate models of the form

$$y_{k,w} = \alpha_k + \beta_{1k}|r_w| + \beta_{2k}|r_w|^2 + \gamma_k x_{k,w}^{\text{Fri}} + \varepsilon_{k,w}, \qquad w \in \text{pre}, \tag{3}$$

where $|r_w|$ is the absolute CME close-to-reopen return and $x_{k,w}^{\text{Fri}}$ is the relevant Friday pre-close baseline. The quadratic move term and Friday baseline are included only when they improve out-of-sample prediction under leave-one-out cross-validation within the pre-launch period.

We then use the selected pre-launch model to predict each of the 17 clean post-launch weekends:

$$e_{k,w} = y_{k,w}^{\text{actual}} - \widehat{y}_{k,w}^{\text{historical}}, \qquad w \in \text{post}. \tag{4}$$

For spread and stabilization outcomes, a positive residual indicates poorer reopening quality than pre-launch history predicts. For volatility, it indicates greater-than-predicted information arrival and is not, by itself, interpreted as market-quality harm.

This exercise is a predictive historical benchmark rather than an estimate of the total causal effect of the xyz:CL launch. It conditions on the realized weekend move and therefore asks how well CME processed a shock of a given size. Confidence intervals are constructed from bootstrap draws that repeat both specification selection and estimation. We also compare the actual post-launch mean residual with placebo windows generated from eligible pseudo-launch dates in the pre-period, using the same training rule and 17-week evaluation horizon.

Table 3: Post-Launch WTI Reopening Quality Versus Pre-Launch Predictions

Outcome	**Predicted post-launch mean**	**Actual post-launch mean**	**Mean residual (95% CI)**	**Weekends worse than predicted**	**Placebo windows at least as adverse**
Median first-30m spread (bps)	4.61	3.98	-0.63 (-1.64, +3.36)	6 of 17	93%
Maximum first-30m spread (bps)	11.30	16.53	+5.24 (-17.30, +26.37)	5 of 17	0%
First-30m volatility	0.00044	0.00169	+0.00125 (-0.00143, +0.00417)	11 of 17	0%
Spread stabilization time (minutes)	75.8	30.2	-45.6 (-134.6, +36.7)	2 of 17	100%

The pattern splits along the information-versus-harm distinction. On the harm outcomes, post-launch reopens were better than history predicts. The typical post-launch weekend had median spreads 0.63 bps below prediction, and spreads stabilized 46 minutes faster than predicted. The bootstrap confidence intervals

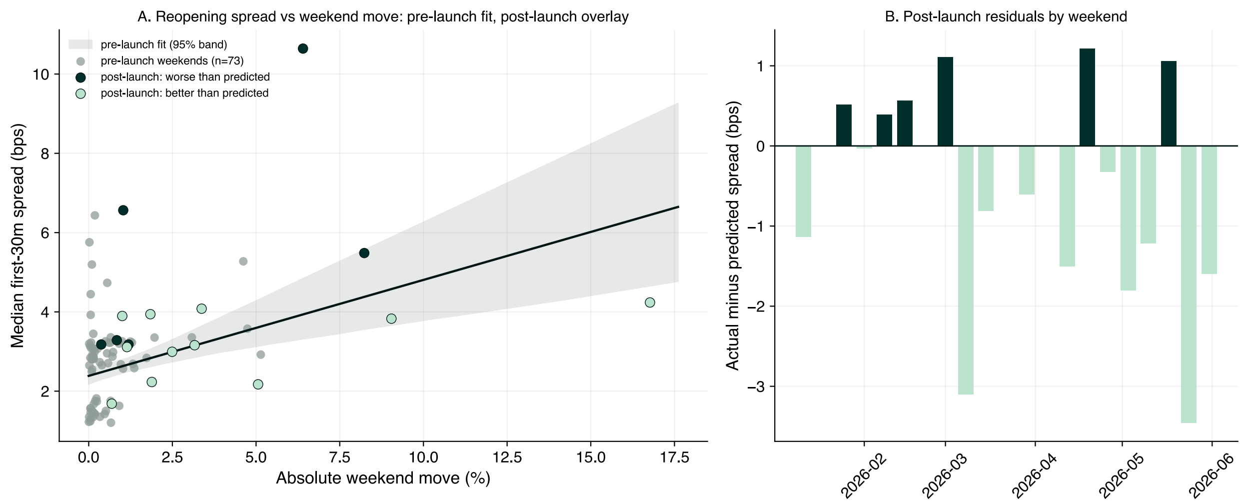


Figure 8: Within-WTI Historical Conditional Benchmark for Reopening Quality

comfortably include zero for both, so these point estimates are favorable but not individually distinguishable from no effect. The placebo comparison is the sharper statement, and it is unambiguous: 93% of pre-period placebo windows were more adverse than the actual median-spread residual, and *every* placebo window was more adverse than the actual stabilization residual. The outcomes that ran above prediction (i.e., volatility and the maximum spread) are information-arrival signatures, with intervals straddling zero and the maximum-spread mean pulled by two extreme geopolitical weekends (its *median* residual is -1.8 bps). As Figure 8 shows, the two largest post-launch weekend moves sit *below* the pre-launch prediction band: CME absorbed unusually large information flows with tighter, faster-settling books than its own history would predict.

4.2.3 Cross-market robustness using untreated commodity benchmarks

Our third design is a cross-market comparison. Since no commodity is a perfect counterfactual for WTI (because commodities differ in their sensitivity to weekend information), we therefore use CBOT corn and wheat (ZC, ZW) as a cross-market robustness exercise. Neither was referenced by a *traded* HIP-3 perpetual at any point in the sample (both are listed on the HIP-3 DEX but have never traded), so they are uncontaminated zero-dose benchmarks, while their news processes differ from crude oil. For commodity a and weekend w we estimate:

$$y_{aw} = \alpha_a + \lambda_w + \beta\left(\mathrm{CL}_a \times \mathrm{Post}_w^{\mathrm{HIP3}}\right) + \varepsilon_{aw} \tag{5}$$

where CL_a is the treated commodity, the controls are corn and wheat, and $\mathrm{Post}_w^{\mathrm{HIP3}}$ equals one for weekends after the xyz:CL launch. Commodity fixed effects absorb persistent cross-commodity differences (including the different tick-to-price ratios that make grain spreads structurally wider in basis points) and weekend fixed effects absorb common market conditions; what the design cannot absorb is oil-specific weekend news, which is why we read it as a comparative case study rather than a causal estimate.

None of the market-quality measures shows a consistent sign of harm. Whether we benchmark oil against corn or against wheat, spreads and stabilization times do not reliably worsen, and the uncertainty around every estimate comfortably includes zero. The one measure that rises relative to grains is the size of the reopening jump itself, but that reflects information arriving over unusually eventful weekends, not a degraded market. It shrinks by two-thirds once the two most extreme weekends are set aside, and the within-WTI test in the previous section, which already accounts for how large each weekend's move was, finds reopenings no worse than history predicts. Oil and the grain benchmarks also tracked each other closely before the launch, so the comparison is not being driven by a pre-existing divergence.

Table 4: Cross-Market Robustness: CL Versus Untreated Grain Benchmarks

Outcome	**Pooled (95% CI)**	**Corn**	**Wheat**
Market-quality (harm) outcomes — a positive value means worse			
Median first-30m spread (bps)	−3.6 (−17.1, +3.8)	−4.6	+0.0
Maximum first-30m spread (bps)	+7.7 (−34.0, +47.2)	+4.8	+17.3
Spread stabilization (min)	+21.7 (−33.8, +76.4)	+51.9	−16.4
Information-arrival outcomes — a rise is not harm			
Absolute open gap (pp)	+2.0 (+0.3, +4.0)	+2.2	+1.5
First-30m volatility	+0.0007 (+0.0003, +0.0012)	+0.0008	+0.0007

Positive coefficients denote worse reopening quality on the harm outcomes; the open gap is shown in percentage points. Intervals are weekend-cluster bootstrap. The absolute open gap is the only outcome flagged by the pre-period placebo test ($p = 0.001$; all others 0.09–0.36), and it falls to +0.7 pp once the two most extreme weekends are excluded—consistent with oil-specific weekend news, not market-quality harm (see text).

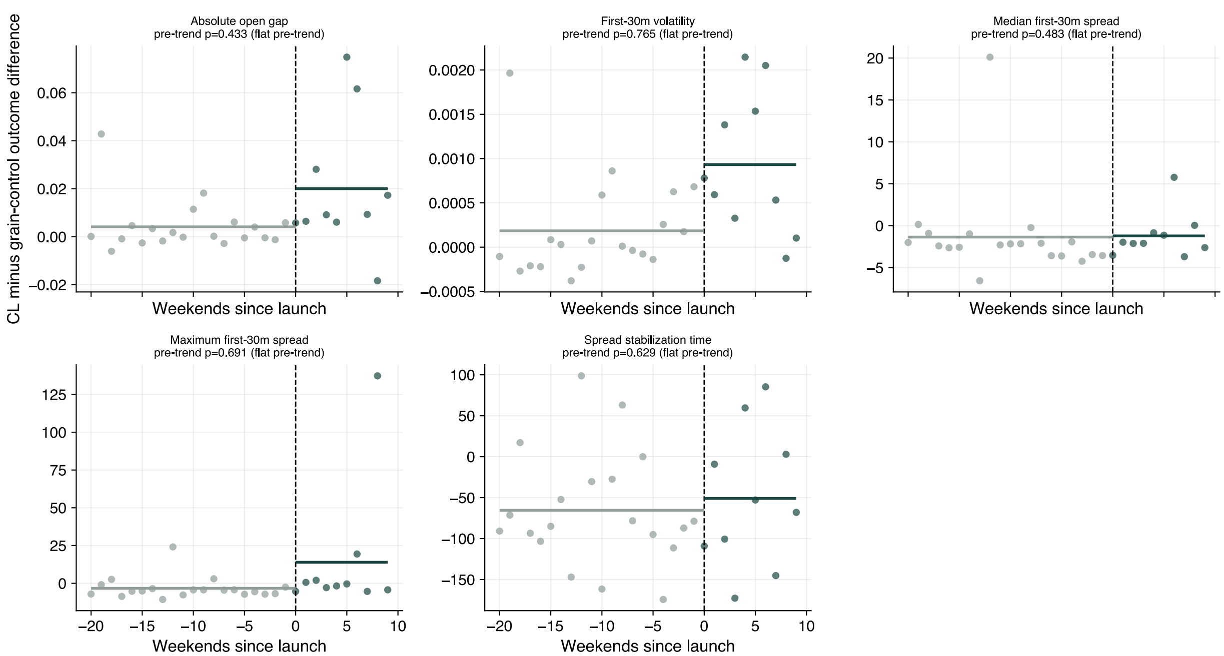


Figure 9: Cross-Market Pre-Trend Check (CL vs Grain Controls)

Figure 9 shows the dynamic, event-time version of this comparison, specifically the CL-minus-grain-control difference in each outcome by weekend relative to the launch. All five pre-launch trends are flat (slope p-values 0.43 to 0.77), so the parallel-trends assumption the comparison relies on is supported: oil and the grain benchmarks were not already diverging before xyz:CL launched.

4.3 Funding design

The price-discovery results call into question what is keeping the perpetual futures price tethered to the spot price when the benchmark reference is closed. As previously discussed, funding mechanisms are a critical component of design that anchor the perpetual price to a reference price (which is necessary because the perpetual cannot converge to the spot price at expiry). Since xyz:CL references CME WTI in its funding calculation, weekends are particularly susceptible to drift, which would call into question the closure-bridge results presented earlier.

4.3.1 Oil funding resembles an anchoring mechanism for off-hours price discovery, not untethered drift

Here, we employ three tests to examine whether the funding rate premium resembles genuine off-hours price discovery or untethered drift absent a current benchmark.

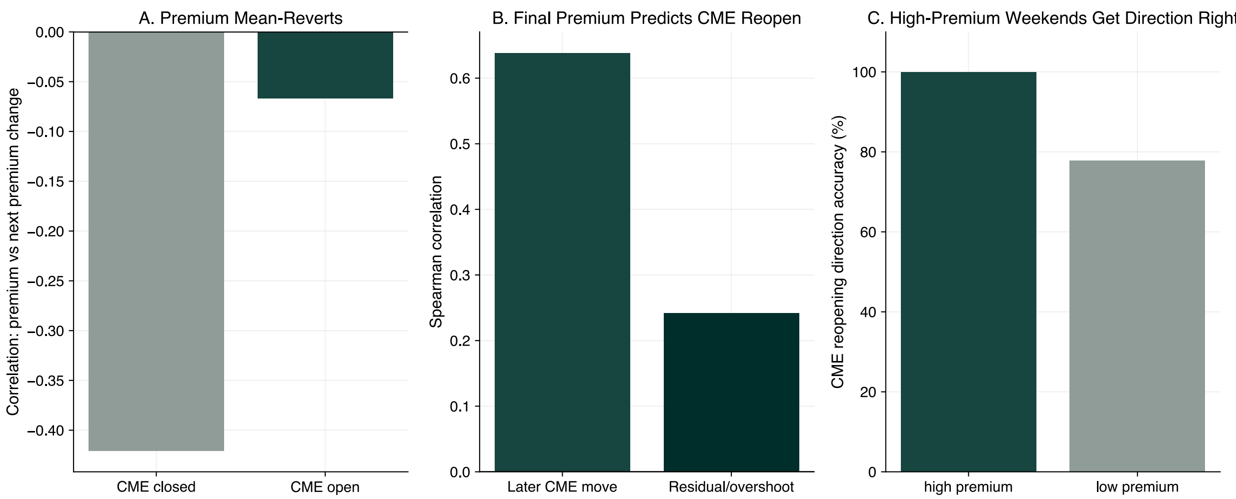


Figure 10: xyz:CL Funding Rate Dynamics

Panel A of Figure 10 looks at mean reversion of the funding rate premium. Over roughly 1,406 hourly observations while CME is closed, a larger xyz:CL funding rate premium is followed by a smaller premium, as evidenced by a negative rank correlation between the premium and its subsequent change, which is strongly statistically significant. We also find (Figure 10, Panel B) that across 19 oil weekends, the final off-hours funding rate premium is positively associated with the subsequent CME reopening move. This means that the funding rate that was carried into the reopening lined up with where the benchmark eventually opened. Finally, we consider whether the last off-hours move and the subsequent reopen move share the same sign and find that they do in 74% of all weekends and roughly 100% of high-premium weekends. This suggests that the funding-rate mechanism is operating as an anchoring or discovery mechanism, not untethered divergence.

Figure 11 plots the funding rate (Panel B) against observed price moves for CME WTI and xyz:CL (Panel A) around a weekend closure. Panel C shows the final weekend funding rate premium compared to the CME reopening return. In 74% of clean weekends in our sample, the final weekend premium matches the direction of the reopening return, which supports the view that funding is serving as a means of off-hours price discovery.

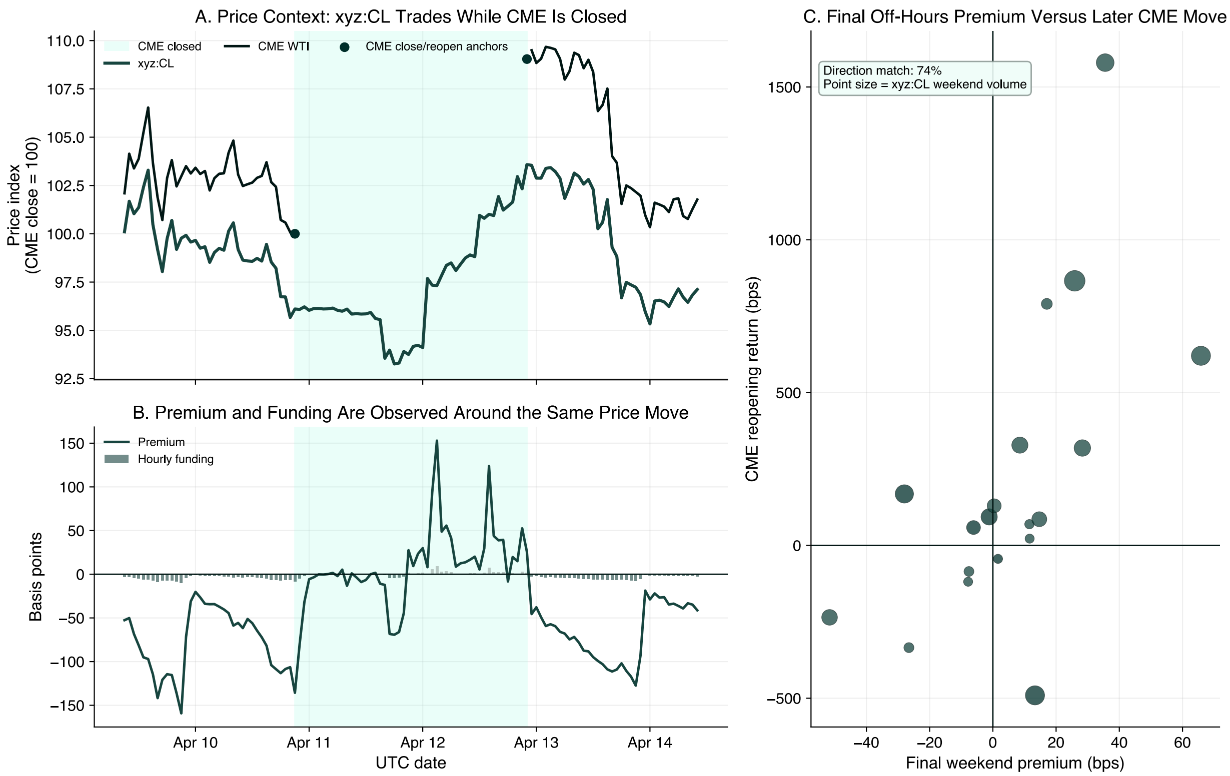


Figure 11: xyz:CL Funding Rate Behavior During Off-hours Moves

4.4 Access, trade size, and market expansion

The final stage of our analysis looks at participants.

4.4.1 Hyperliquid trade sizes point to smaller ticket size and a broader participant base

The market-expansion hypothesis would be supported by evidence that perpetual futures serve a different participation layer, as opposed to absorbing flow that is substituting away from the incumbent. To test this, we use onchain data to construct ten-minute sample windows of finalized xyz:CL trades and compute the median fill notional and the share of fills below $1,000. We do this separately for windows when the CME benchmark is open and closed.

Figure 12 presents the results. Although we cannot attribute specific wallet addresses to specific types of traders (e.g., hedgers, speculators, arbitrageurs, market makers, etc.), we can leverage this analysis to understand the size distribution of activity. The average trade size for xyz:CL perpetual futures during closed-hours sessions is substantially smaller than the open-hours sessions for CME WTI, strongly suggestive that Hyperliquid serves a different user base that may not have the access ability or sophistication level to use dated-expiry futures.

Taken as a whole, each of the four pillars points to the same thing: (i) off-hours trading of perpetual futures carries information that is later validated by the benchmark; (ii) the information is usable for hedging at realistic costs; (iii) there is no detectable cost to the incumbent market; and (iv) the funding rate mechanism and participant evidence suggest expansion rather than substitution.

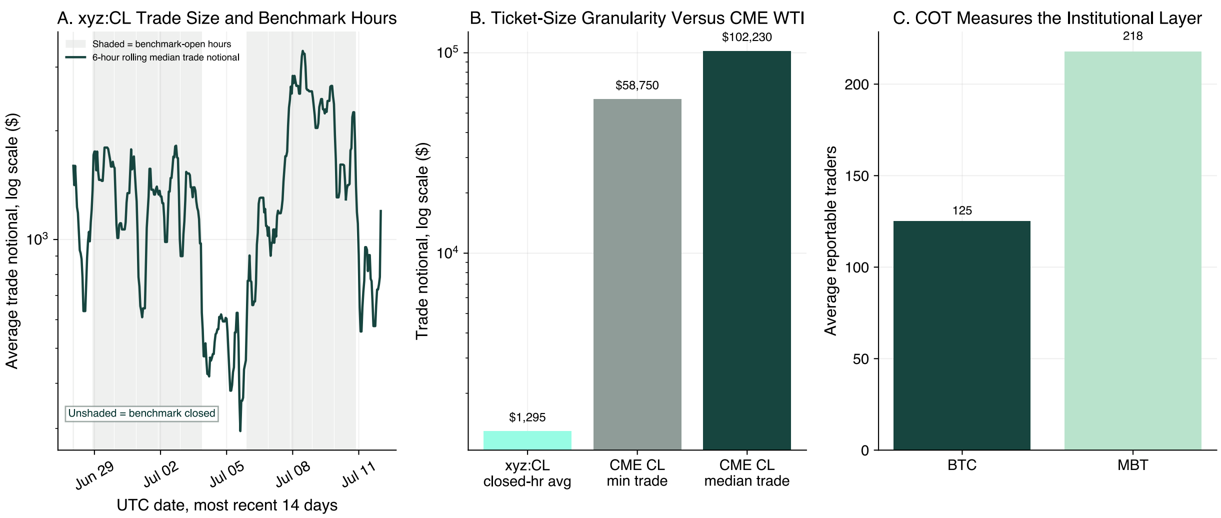


Figure 12: Access Layer Differentiation

5

Policy Implications

5 Policy implications

The Commodity Futures Trading Commission (CFTC) is now considering whether perpetual contracts should extend to physically deliverable commodities such as crude oil, and the research presented here provides useful data for that evaluation. Perpetual futures offer market participants tangible utility. As an instrument that inherently trades 24/7, they extend price discovery into the hours when benchmark markets are closed, and provide a more efficient way to assume and manage price risk, concentrating liquidity in a single contract that participants of nearly any size can access. Our data show these benefits operating in live markets today, and over the same period they show no statistically significant detrimental effect on the incumbent markets that perpetuals reference. Taken with the participation evidence in Section 4.4, our findings support the market-expansion view developed in Section 2: market participants are generally better off when a greater variety of instruments is available to meet their hedging needs.

Our findings support four policy considerations, set out below:

1. **Perpetual futures perform the familiar risk-transfer function of dated futures at lower cost.** Both instruments anchor a derivative price to the underlying, and the anchoring design drives the cost of maintaining exposure. A dated contract converges through expiry, which obliges hedgers to roll positions on a fixed calendar, fragments liquidity across a ladder of maturities, and imposes a minimum ticket size set by the exchange. A perpetual converges through funding, which concentrates liquidity in a single order book, carries no expiry to manage, and accommodates positions of any size. The roll analysis in Section 2.1.7 quantifies this cost to market participants. During the April 2026 roll window, identical roll transactions executed four days apart differed in cost by more than $800,000 on $10 million notional, a timing exposure that a perpetual position never encounters. Each roll is an acute market event: to keep its exposure, a commercial hedger must execute a forced transaction inside a fixed window, paying venue fees on both the closing and reopening legs, crossing whatever calendar spread prevails, and absorbing any losses on the switch between contracts. A perpetual position maintains the same exposure without ever confronting that event.

2. **Perpetual futures open hedging to participants that standard contracts do not economically serve.** A dated futures hedging program carries fixed costs, including margin operations, roll management, and exposure large enough to fill standard contract units, and the academic literature reviewed in Section 2 finds that these costs fall hardest on the smallest firms. The xyz:CL trading records show where those smaller participants go when the fixed costs are reduced. Median trade sizes during benchmark off-hours run near $1,300, roughly two orders of magnitude below the median CME WTI trade, which indicates a layer of participants transacting at scales the benchmark contract is not designed to accommodate. Activity at that scale represents new demand for risk transfer, and new demand grows the overall market. Policymakers can reasonably read this participation pattern as expansion, with perpetuals reaching hedging needs the existing contract suite leaves unmet.

3. **Off-hours perpetual prices deliver useful price discovery, and hedgers can act on it at realistic cost.** Benchmark futures markets close every weekend, and commercial price risk does not. Across our full sample, weekend moves in perpetual markets passed through to the CME reopening nearly one-for-one, so the information generated during the closure was informative, and later confirmed by the benchmark reopen. That information proved economically usable as well. During the largest weekend move in our oil sample, a simulated perpetual hedge reduced reopening exposure on a $10 million position from $1.58 million to roughly $62,000 after funding and transaction costs, and the sensitivity analysis in Appendix A shows the hedge reducing average losses across every combination of hedge ratio and cost assumption we tested. The funding mechanism anchored prices throughout these closures, with off-hours premia reverting toward the reference and matching the direction of the reopening move on the weekends where the premium was largest. Continuous perpetual markets convert a weekend closure from a period of forced exposure into ordinary, manageable trading time.

4. **Perpetual markets show no statistically significant harm to the incumbent markets they reference.** A natural concern with any new instrument is that it may adversely affect the market it tracks, and we tested that concern directly. Under a difference-in-differences design comparing CME crude oil against corn or wheat around the xyz:CL launch, reopening quality shows no statistically

significant deterioration across opening gaps, first-30-minute volatility, spreads, or stabilization times, and the result holds in balanced samples and after excluding the most extreme weekends. Busier perpetual trading weekends likewise fail to predict wider reopening spreads or slower stabilization. These results are consistent with complementarity, and they give policymakers an empirical basis for weighing the market degradation concerns raised by some critics against observed market behavior.

Perpetual markets on physically deliverable commodities are in their early days, and the evidence so far is encouraging. Our oil sample covers months of trading rather than years, and the estimates will sharpen as these markets mature. The pattern emerging in oil matches what we observe in bitcoin, where perpetuals have the longest history. Bitcoin perpetuals have traded alongside CME futures since 2017, and across 205 clean weekends they display the same relationships we observe in oil: prices that bridge closures, hedges that work at realistic costs, and an incumbent benchmark that trades no worse alongside them. On this record, perpetuals referencing physically deliverable commodities merit evaluation as differentiated market infrastructure that lets additional classes of market participants assume and manage price risk at lower cost, and each additional market and trading weekend will add the statistical power to confirm or qualify these results.

6

Conclusion

6 Conclusion

This report examines whether continuously-traded perpetual futures contracts referencing benchmark futures complement or undermine the markets whose prices they track, using tick- and minute-level data from the CME, offshore centralized digital asset venues, and HIP-3 perpetual futures markets on Hyperliquid. The evidence supports complementarity through three channels.

First, weekend moves in perpetual futures markets pass through to the CME benchmark's Sunday reopen approximately one-for-one. Relative to a stale Friday close, the perpetual futures price improves the reopening forecast in roughly three-quarters of weekends in our sample. Second, in the context of risk transfer, a commercial hedger carrying exposure over the weekend could have dramatically reduced absolute losses by using perpetual futures rather than dated futures. Finally, since there is no need to roll a perpetual futures contract, perpetual futures traders are not faced with the risk associated with rolling, including roll timing and operational complexity. At the same time, our research finds no robust evidence of harm for incumbent markets, including where a continuously-traded perpetual references the incumbent market directly.

7

Appendix

7 Appendix A

Appendix A shows the results of a sensitivity analysis that asks how the hedge result from the Section 4.1.3 would hold up under different hedge ratio or transaction-cost assumptions. It evaluates four hedge ratios (50%, 75%, 100% and the out-of-sample leave-one-weekend-out ratio) against transaction-cost assumptions spanning from 1 bp to 25 bps. Across the entire grid, the hedge reduces average absolute reopening exposure, which gives us confidence that the benefits of hedging using perpetual futures are not a mere artifact of the data.

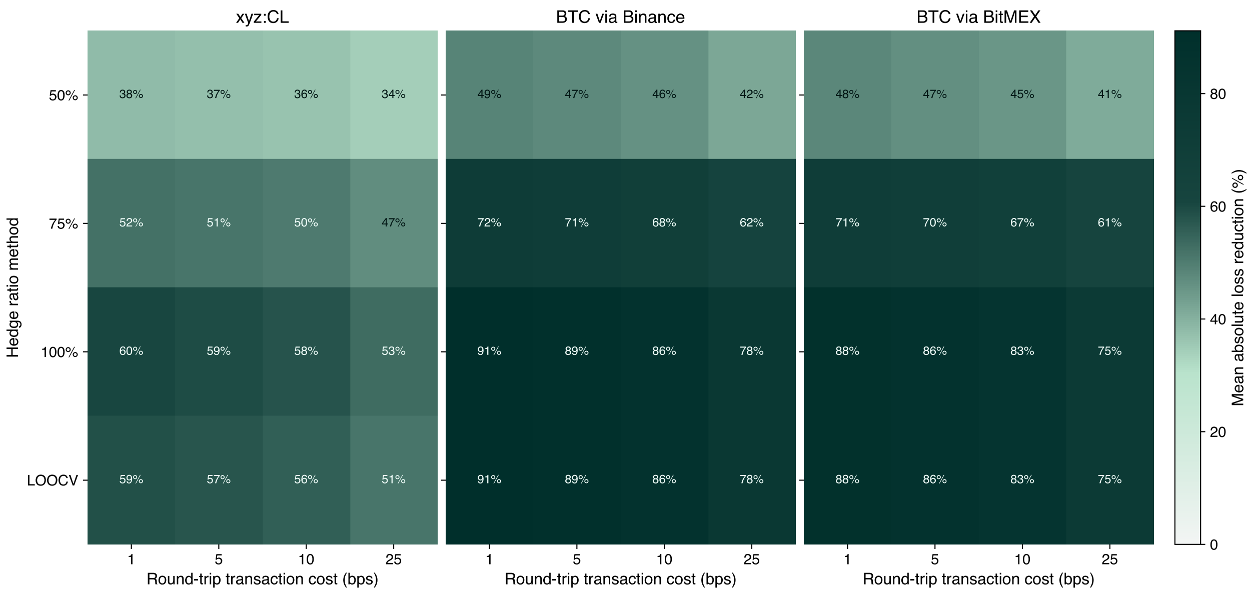


Figure 13: Hedge Robustness Check

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