The Protocol Fee Discount Auction

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Abstract

We propose the *protocol fee discount auction* (PFDA), a novel auction mechanism for the Uniswap protocol that simultaneously adds a new source of protocol fees while also improving liquidity provider (LP) returns. PFDA enables any agent, including arbitrageurs, to bid for the right to trade without paying protocol fees for a specified period, with auction proceeds directed to the protocol (which could in turn, for example, choose to burn the fees). The auction winner can then capture price discrepancies that would otherwise have been unprofitable. By internalizing these small arbitrage opportunities, PFDA improves LP returns and increases protocol fees, effectively redirecting MEV from searchers and validators to the protocol. It also improves price efficiency, since the auction winner can correct minor price gaps without incurring additional fees.

We develop a theoretical model based on the loss-vs-rebalancing framework to understand the impact of PFDA on arbitrage trading. We demonstrate that PFDA can increase protocol fees by 0-3%, reduce LP arbitrage losses by 0-6.5%, and decrease validator revenue by 0-19% across various fee structures and volatility levels, for reasonable parameter values. Calibrating our theoretical model with empirical data shows that, for a number of popular Uniswap v3 pools, on a markout basis PFDA can improve overall LP returns by up to 49% in pools that are already profitable for LPs and reduce losses by 11-319% for pools that are not profitable. On a per dollar traded basis, LP markout profitability improves by 0.06–0.26 bp per dollar traded in the pools under consideration. This is significant, given that the magnitude LP markout profitability is typically on the order of ~1 bp per dollar traded across the pools.

1 Introduction

Today, anyone in the world can passively provide liquidity for any cryptoasset, at any time, anywhere in the world. The Uniswap Protocol popularized passive liquidity provision with Uniswap v2[Adam et al. 2020] and unlocked a new ecosystem of decentralized financial applications that take advantage of always-on markets. Since then, Uniswap Protocol has facilitated over $3.9 trillion in trading volume,[1] and LPs have earned over $5.8b in fees for the service of providing liquidity.

Since deploying Uniswap v2 in 2020, Uniswap Labs has developed protocol upgrades that enabled more flexible and powerful passive liquidity provision strategies. With Uniswap version 3 [Adams et al. 2021], Uniswap Labs introduced “concentrated liquidity”, which enabled LPs to provide liquidity with up to 4000x greater capital efficiency than in Uniswap v2 [Uniswap Labs 2021]. Follow-up research showed that liquidity providers in Uniswap v3 supported greater market depth than the most liquid custodial exchanges in the world [Liao and Robinson 2022]. With Uniswap version 4 [Adams et al. 2024b], deployed earlier this year, Uniswap Labs helped the protocol evolve into a platform in which independent and unrelated developers could define arbitrary liquidity provision strategies for LPs by deploying “hooks” into the automated market maker (AMM) core.

Simultaneously, Uniswap Labs and its collaborators have led, supported, and implemented research in auction design that improves onchain trading for retail swappers and LPs. For example, the auction-managed AMM, discussed later in this paper, proposed an *ex ante* auction to dynamically price liquidity provision in response to market conditions and therefore increase passive liquidity provider revenue [Adams et al. 2024a]. UniswapX uses a first-of-its-kind onchain Dutch auction that meta-aggregates optimal routing for swappers by enforcing competition between “fillers” [Adams et al. 2023]. New versions of the onchain Dutch auction used machine learning to dynamically set auction parameters to achieve optimal execution [Bachu and Wu 2024].

As Uniswap governance considers activating the “fee switch” built into versions 2, 3, and 4 of the protocol, Uniswap Labs has developed an auction mechanism designed to both increase protocol fees and improve LP outcomes if the switch were enabled. This paper introduces the protocol fee discount auction (PFDA), through which bidders compete for the right to trade without paying protocol fees. Governance could direct the resulting auction proceeds to any destination, such as the proposed TokenJar contract.

PFDA is targeted toward MEV searchers, specifically those who profit from DEX-CEX arbitrage trading. These actors generate the most toxic flow since they trade against the pool only when there are arbitrage opportunities. Instead of competing for block inclusion, where rewards flow to validators via builder auctions or priority gas auctions, these actors would compete in an onchain auction for

[1] https://dune.com/mud2monarch/uniswap-protocol-stats

fee-free trading rights, with proceeds directed to the protocol. The winning bidder's lower trading costs allow them to capture smaller price discrepancies and, anticipating this advantage, competitors would bid that value back to the protocol. With lower effective fees, the auction winner trades more frequently, helping to correct pool prices more often which ultimately improves LP outcomes.

In effect, PFDA redistributes MEV that would otherwise accrue to searchers and validators, improving outcomes for LPs and increasing protocol fees. It also enhances price efficiency by enabling small, low-cost corrections.

The balance of the paper is organized as follows. In Section 2, we describe the auction mechanism in detail, and discuss the design space and implementation considerations. In Section 3, we develop a theoretical model based on the loss-vs-rebalancing framework to understand the impact of PFDA on arbitrage trading. In Section 4, we calibrate our theoretical model with empirical data to predict the overall impact of PFDA, considering both arbitrage and non-arbitrage trading, on popular Uniswap v3 pools.

1.1 Prior Work And Current Challenges

PFDA is inspired by past work related to auctions for the right to capture arbitrage profits within AMM pools. Hermann [2022] proposed the MEV capturing AMM (McAMM), which used an *ex ante* auction where the winner won the right to make the first trade within a block and pay no swap fee. Auction proceeds would be distributed to LPs based on the observation that an auction would efficiently price the value provided by LPs in a competitive market. While potentially effective at maximizing revenue from arbitrage traders, the McAMM may not have effectively maximized revenue from so-called "noise traders", i.e., those trading for idiosyncratic reasons other than arbitrage. Additionally, because the auction winner could block all others from trading within a block, the McAMM did not have the property of *accessibility*, especially important for synchronous composability within DeFi.

Improving upon the McAMM, Adams et al. [2024a] proposed the auction-managed AMM (am-AMM), which likewise used an *ex ante* auction, proposed to be implemented as a Harberger lease, to permit the auction winner to effectively swap without fees. Because the auction winner would have lower trading costs, the authors showed that the winner would likely capture the majority of arbitrage opportunities, accomplishing the same goal as the McAMM. Rather than swap for free, though, the auction winner in the am-AMM would set and collect the pool swap fee, up to a limit. Because LPs earned the auction payment, the am-AMM increased the likelihood that passive LPs would earn maximum revenue from noise traders, in addition to earning maximum revenue from arbitrageurs. The authors formalized important auction parameters and outcomes including defining "arbitrageur excess", or the amount of arbitrage opportunity for which the auction winner would still have to compete with others to win, which is a form of lost revenue from the perspective of passive LPs. They also defined a delay period of K blocks, which was to be set such that the chance of exclusion for such blocks was negligible. The authors also showed that under certain reasonable assumptions the am-AMM would always increase liquidity over a fixed fee AMM.

Our paper builds on the loss-vs-rebalancing framework established in Milionis et al. [2024] and Milionis et al. [2025] as a model for liquidity provider profit and loss in AMMs.

2 Mechanism

We propose a flexible protocol fee discount auction mechanism that can be adapted to different market conditions. Under this mechanism, bidders compete in a first-price auction for the right to trade without paying protocol fees for a specified number of blocks. While all other traders continue to pay the standard protocol fee, the auction winner enjoys a cost advantage that positions them to capture arbitrage opportunities more efficiently. We will later show that under reasonable parametric assumptions, this mechanism would simultaneously increase inflows for the protocol while decreasing LP losses to arbitrage.

The mechanism operates as follows. Bidders deposit collateral to participate in an auction for protocol fee-free trading rights across one or more designated pools for a specified future period. To minimize exclusion risk, trading rights become active only after a predetermined delay following auction conclusion. The highest bidder wins the right to trade without protocol fees during the designated period while other participants continue paying standard fees. Notably, the mechanism can be selectively applied; governance could apply the auction-based system to some pools while keeping it off for others.

2.1 Design Space

The auction mechanism operates along several key dimensions that can be configured to optimize performance across different market conditions and pool characteristics:

- *Auction format* is the type of auction to use, such as an English auction, a Dutch auction, or a Harberger lease as described in the am-AMM paper [Adams et al. 2024a].
- *Deposit structure* determines the financial commitment required from participants. For an English auction, this is the bid amount. For a Harberger lease, this should be the cost of the lease given the minimum lease length.
- *Delay parameter* can be implemented to mitigate exclusion risk for bids, similar to the approach taken in the am-AMM design.
- *Bidding target* represents the set of pools to which each auction applies. This can be a single pool or a set of pools.

This flexibility enables the mechanism to adapt to diverse market structures and participant preferences while maintaining efficient price discovery.

2.2 Implementation Considerations

Several practical considerations influence the optimal configuration of the auction mechanism.

- *Gas efficiency.* Bidding costs ultimately reduce protocol fees. A Harberger lease structure, as described in the am-AMM literature, may prove particularly suitable since bids only occur when an implied change of winner would happen, minimizing unnecessary gas expenditure.

- *Pool selection.* Our mechanism assumes a competitive market for protocol fee-free trading rights. This might not hold for long-tail assets where holding inventory is either costly or risky. In such cases, the introduction of PFDA may not be preferable. The mechanism should therefore be deployed selectively, focusing on pools with sufficient volume and arbitrage opportunities to support competitive bidding.
- *Aggregation level.* Auctions conducted at the pair level may be more valuable than the sum of individual pool auctions when the same participants are likely to bid across all pools for a given pair. Conversely, when pools attract divergent bidder sets due to different characteristics or strategies, separate auctions may optimize price discovery. This is especially relevant for Uniswap v4, where the number of pools per pair might be large, and the pools could be quite different.
- *MEV considerations & bid exclusion.* The auction should be configured with appropriate delay periods to ensure censorship resistance and to reduce MEV in the bidding process.

2.3 Scope and Implementation

This paper presents a general framework for PFDA rather than prescribing a specific implementation. The flexibility inherent in the design allows for adaptation to various AMM architectures and market conditions. For the purposes of theoretical analysis in subsequent sections, we adopt a particular implementation specification to enable concrete modeling and empirical validation of the mechanism's properties.

The auction design considerations established in the am-AMM literature provide valuable guidance for parameter selection and implementation strategies. However, the unique characteristics of protocol fee auctions — particularly their compatibility with existing concentrated liquidity systems — create new opportunities for optimization that merit continued research and development.

3 Model

In this section, we present a model of PFDA that allows us to analyze the properties of the mechanism. We will focus on the impact of the PFDA on the trading behavior of arbitrageurs and the resulting impact to protocol fees, validators, and LPs. Here, our focus is on arbitrageurs because they are the most active and high volume participants in the market and hence the most likely to participate in the PFDA in order to trade without paying protocol fees. In Section 4, we will use this model to analyze the impact of the PFDA on the overall profits of LPs, accounting for both arbitrage and non-arbitrage trading.

Broadly speaking, we follow the setting of Milionis et al. [2024], including follow on work such as Milionis et al. [2025] and Adams et al. [2024a]. The key idea here is to measure loss-vs-rebalancing (LVR), the loss in value of the LP's underlying assets due to stale prices that are exploited by arbitrageurs. We aim to understand the impact of PFDA on LVR and on arbitrage profits, and how it compares to the absence of PFDA.

Assets. We consider an AMM trading a risky or volatile asset (denoted by x) versus the numéraire or cash asset (denoted by y). We assume that the risky asset x has a fundamental price (in units of y) given by P_t at any time $t \geq 0$. We assume that the price process is a geometric Brownian motion, i.e.,

$$\frac{dP_t}{P_t} = \mu\, dt + \sigma\, dB_t, \quad \forall\, t \geq 0,$$

with drift μ, volatility $\sigma > 0$, and $\{B_t\}$ being a standard Brownian motion. Following Milionis et al. [2025], we set $\mu = \sigma^2/2$ to simplify expressions and normalize so $P_0 = 1$.

AMM Pool. We consider a constant product pool, i.e., at any time $t \geq 0$, the pool holds x_t units of x and y_t units of y, and the product $x_t y_t$ is constant, i.e., $\sqrt{x_t y_t} = L$. Without loss of generality, we can assume $L = 1$. The pool's spot price at time t is given by $\tilde{P}_t = y_t/x_t$. We define the pool's (log) mispricing at time t as $z_t = \log P_t/\tilde{P}_t$.

Fee Structure. Consistent with Adams et al. [2021], we assume that the pool has a swap fee f that is paid by a swapper on the input side of the transaction and realized as a separate cash flow to pool LPs. For mathematical convenience, following Milionis et al. [2025], this is specified as a logarithmic fee, so that the total fee paid by the swapper is given by a $e^f - 1 \approx f$ proportion of the swap input amount. Of the overall swap fee f, a fraction $e^s - 1 \approx s$ is paid to the protocol. Here, s is the (log) protocol fee, while f is the (log) overall swap fee.

Pool Dynamics. For tractability, we assume that blocks are generated according to a Poisson process with rate Δt^{-1}, where Δt is the average inter-block time.[2] We assume that there is a set of arbitrageurs in a competitive equilibrium. These arbitrageurs myopically trade against the pool at each instant of block generation, until they cannot (net of fees) make a profit buying or selling from the pool and hedging at the fundamental price.

No-Auction Setting. In the absence of a protocol fee auction, the arbitrageurs are willing to trade against the pool until there is zero marginal profit net of fees, i.e., until the absolute value of price discrepancies $|z_t|$ is less than or equal to the swap fee s. Since only the first arbitrageur to trade against the pool will make a profit, the arbitrageurs compete against each other for inclusion at the top-of-block position. We assume that, because of this competition, all of the arbitrage profits are redistributed to validators. This could be the case, for example, if arbitrageurs compete for top-of-block inclusion through a priority gas auction held by a validator or a builder auction held by a builder in the setting of proposer-builder separation (PBS).

Protocol Fee Discount Auction Setting. In the PFDA setting, the auction winner has a cost advantage over other arbitrageurs, because they can trade while paying no protocol fees at a net fee of $s - f$. In particular, when the price discrepancy $|z_t|$ falls within the interval $[s - f, s]$, the auction winner is willing to trade against the pool, while other arbitrageurs are not, and hence the auction winner can fully capture such small arbitrage opportunities. On the other hand, when the price discrepancy $|z_t|$ is larger than s, the auction winner must compete with other arbitrageurs to trade

[2]Following Milionis et al. [2025], we make this assumption to allow closed-form solutions. Nezlobin and Tassy [2025] consider the more general case of deterministic and generalized block-times, and observe that the LVR properties are qualitatively similar.

against the pool, and hence we assume that arbitrage profits (without the fee discount) from reducing the price discrepancy to s are redistributed to validators.

We assume that, in steady state, the auction winner trades according to a threshold-based strategy defined by a hurdle level h and a trade-to level d, with $f - s \leq d \leq h$. The auction winner trades if and only if the price discrepancy exceeds the hurdle level, i.e., $|z_t| \geq h$. If the auction winner does trade, they trade until the price discrepancy reaches the trade-to level, i.e., $|z_t| = d$, at which point they stop trading. The parameters h and d are chosen to maximize the auction winner's profit.

We assume that the protocol fee auction is also competitive. That is, the auction winner will bid the full amount of their future expected profits to win the auction.

Steady State Analysis. In both the presence and absence of a protocol fee auction, the price discrepancy z_t is a Markovian jump-diffusion process. We can derive the steady state distribution of price discrepancy using the Laplace transform methods of Milionis et al. [2025]. In particular, the steady state distribution of price discrepancies in the absence of a protocol fee auction is given by Theorem 1 of Milionis et al. [2025], while the steady state distribution in the PFDA setting is given by Theorem 5 therein.

Given the steady state distribution of price discrepancies, we can derive the steady state intensity or instantaneous rate of P&L in closed-form[3] for each of the following entities:

- *Protocol.* In the no-auction setting, the protocol earns the swap fee s from each arbitrageur swap. In the PFDA setting, the protocol earns the auction proceeds from the auction winner. Under our assumptions, this is the full amount of the auction winner's future expected profits and corresponds to the value of profits from correcting smaller price discrepancies, i.e., those less than s.
- *Validators.* In the no-auction setting, the validators (under our competitive assumptions) earn all of the arbitrage profits. In the PFDA setting, the validator only earns the profits from larger price discrepancies, i.e., those greater than s.
- *LPs.* In both settings, trade is zero-sum between the protocol, the validators, and the LPs. Hence, the LPs will lose an amount equal to the sum of the protocol's and validators' profits.

Note that, in all cases, the arbitrageur profits are zero. This is because arbitrageurs are in a competitive equilibrium, hence they earn zero profit net of fees; any profits from arbitrage are redistributed to the protocol or validators.

4 Performance Analysis

In this section, we will use the model presented in Section 3 to analyze the impact of PFDA on protocol fees, validators, and LPs, particularly focusing on the impact on LPs. We start by analyzing the impact on arbitrage trading, and then consider the overall impact, factoring in both arbitrage and non-arbitrage trading.

4.1 Arbitrage-Only P&L Analysis

We first consider the impact of PFDA assuming that the arbitrageurs are the only participants in the market, as described in Section 3.[4] Figure 1 shows the impact of PFDA on the economics of the protocol, validators, and LPs. Each subplot considers a different swap and protocol fee level, and shows the percentage change in fees paid to the protocol and for validators, as well as the percentage reduction of arbitrage losses for LPs, as a function of the volatility σ. Here, the average inter-block time is set to $\Delta t = 12$ (seconds), corresponding (on average) to block times on the Ethereum mainnet.

Note that, across all cases and volatility levels:

- protocol fees increase by 0–3%;
- LP arbitrage losses decrease by 0–6.5%; and
- validator revenues decrease by 0–19%.

Since trades are zero-sum between the protocol, the validators, and the LPs, this implies that PFDA redirects arbitrage profits from the validators to the protocol and to LPs.

4.2 Empirical Overall LP P&L Analysis

In this section, we will use the model presented in Section 3 to analyze the impact of PFDA on the protocol fees, validators, and LPs, considering both arbitrage and non-arbitrage trading. Here, we will use empirical data from a selection of popular Uniswap v3 pools[5] to estimate the impact of PFDA on the overall LP profits. We perform this analysis as follows:

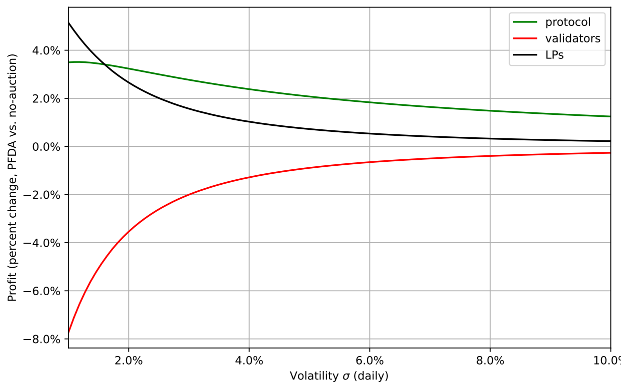
(1) During the sample period of 2025/02/01–2025/09/01, we compute the overall markout (or, realized spread) profit and loss for the pool LPs. For each swap, we compute the profit or loss for the pool, comparing the actual transaction price to a reference price that is determined by the Binance mid-price for that pair 5 seconds after the time of the transaction.
(2) We identify arbitrage wallets by looking at the wallet addresses that (a) have submitted more than 100 swaps; (b) have a positive markout on at least 60% of their swaps; and (c) earn a markout P&L of at least \$10,000 in the sample period. Using this heuristic classification, we decompose the overall markout P&L into arbitrage and non-arbitrage components.
(3) For the counterfactual case where the PFDA is implemented, we reduce the arbitrage P&L by the factor predicted by the model in Section 3.[6] These correspond to the predictions plotted in Figure 1II and Figure 1III, evaluated at the reference daily volatility level $\sigma = 5\%$.

[3]Our P&L calculations are closed-form except for determining the optimal policy parameters (h, d) in the PFDA setting — this optimization is done numerically. We omit the closed-form derivations here for brevity.

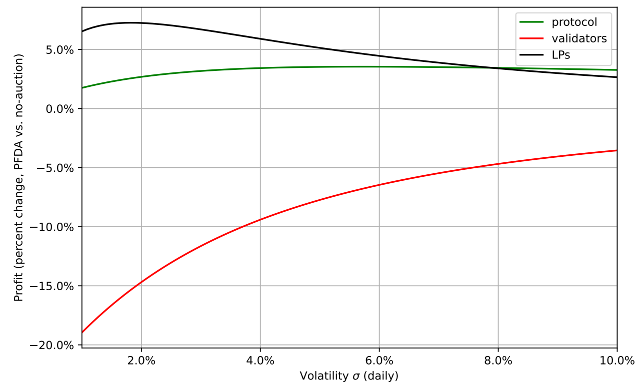
[4]The results presented here are slightly simplified from the earlier model in that we only model the case where pool is underpriced and arbitrage trades buy from the pool. In a constant product AMM, buys and sells are not exactly symmetric, but the difference is small and this is unlikely to significantly affect the results here.

[5]Note that the model developed earlier was in the setting of a constant product AMM, while Uniswap v3 pools are concentrated liquidity AMMs. However, because locally these pools are approximately constant product, the results are likely to be qualitatively similar.

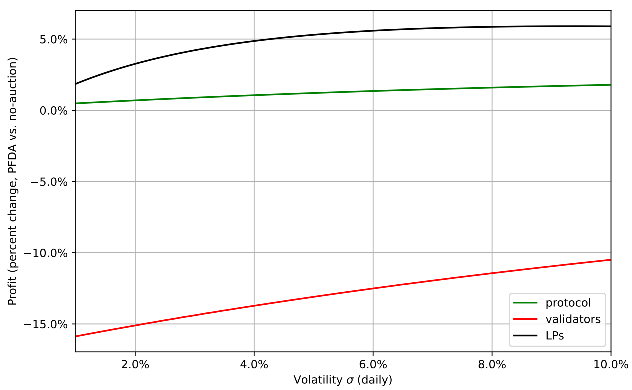
[6]Note that the baseline model of Section 3 assumes that protocol fees are charged in the absence of PFDA. During the sample period of our empirical data, however, there were no protocol fees charged. This is a limitation of our data set, but we will nevertheless to use this baseline to measure the impact of PFDA on overall LP P&L.



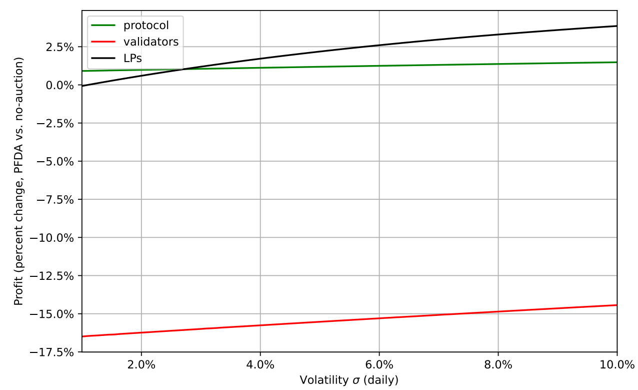
(I) Swap fee $f = 1$ (bp) and protocol fee $s = 0.25$ (bp).



(II) Swap fee $f = 5$ (bp) and protocol fee $s = 1.25$ (bp).



(III) Swap fee $f = 30$ (bp) and protocol fee $s = 5$ (bp).



(IV) Swap fee $f = 100$ (bp) and protocol fee $s = 16.67$ (bp).

Figure 1: The predicted impact of PFDA assuming only arbitrage trading. Each subplot shows the relationship between profit and volatility (σ) for a different swap and protocol fee level. Here, the inter-block time is $\Delta t = 12$ (seconds). Here, for LPs, the percentage changes reported are the percentage reduction in arbitrage losses. For reference, a typical daily volatility value of a pair such as WETH-USDC would be $\sigma \approx 5\%$.

(4) We assume that non-arbitrage trading is not affected by the PFDA, since this trading would pay the standard swap fee f whether or not the PFDA is implemented.[7]
(5) Combining steps (3) and (4), we compute the counterfactual overall markout P&L with PFDA for the pool LPs, including both arbitrage and non-arbitrage trading. We then compare this to the empirical overall LP markout P&L for the pool LPs in the counterfactual case where the PFDA is not implemented.

Table 1 presents the results of this analysis for a selection of popular Uniswap v3 pools. The table shows the decomposition of LP markout P&L into arbitrage and non-arbitrage components, along with the predicted impact of implementing PFDA. The arbitrage P&L reduction factors are based on the model predictions from Figure 1II and Figure 1III, evaluated at a daily volatility of $\sigma = 5\%$.

In all the cases in Table 1, the implementation of PFDA results in approximately a 5% reduction in arbitrage losses according to the model predictions from Figure 1II and Figure 1III. However, given that the LPs make positive profits from non-arbitrage trading, the overall LP markout P&L can increase by a larger amount. For example, in the case of the v3 WETH-USDT 30bp and v3 WBTC-USDC 30bp pools, which were already profitable to LPs without PFDA, the implementation of PFDA results in an increase in overall LP markout profit of 20% and 49% respectively. In other cases where the pools were not profitable to LPs without PFDA, the implementation of PFDA results in decreases of 11–319% in the total LP markout loss. In fact, in the v3 WBTC-USDC 5bp pool, a non-profitable pool without PFDA is predicted to become profitable to LPs with PFDA.

In Table 2, we normalize the LP markout P&L figures from Table 1 by the total volume that is traded in each pool over the sample period. We see that PFDA is predicted to increase the LP profitability by between 0.06–0.26 bp per dollar traded across the pools under consideration. This is significant, given that the magnitude of LP

[7] Although fees paid by non-auction winners would not change under PFDA, they would potentially benefit from the more accurate pricing of the AMM because of increased arbitrage activity. The improved price efficiency of PFDA may in fact increase non-arbitrage trading, although we do not model this here.

Table 1: The predicted impact of PFDA on LP markout P&L for popular Uniswap v3 pools, assuming empirically measured arbitrage and non-arbitrage trading over the sample period 2025/02/01–2025/09/01. The predicted arbitrage loss reduction column reports the model prediction reduction of arbitrage losses, assuming a daily volatility of $\sigma = 5\%$ and inter-block time of $\Delta t = 12$ seconds (cf. Figure 1). The change column reports the percentage change in LP markout P&L with PFDA, relative to the absolute value of the total P&L without PFDA.

Pool	Swap Fee (bp)	Protocol Fee (bp)	Arb P&L ($)	Other P&L ($)	Total P&L ($)	Pred Arb Loss Reduction (%)	Pred Total P&L with PFDA ($)	Change (%)
v3 WETH-USDT	5	1.25	$-4,606,006$	$3,078,925$	$-1,527,081$	5.14	$-1,290,539$	15.49
v3 WETH-USDC	5	1.25	$-17,264,030$	$11,121,755$	$-6,142,276$	5.14	$-5,255,681$	14.43
v3 WBTC-USDC	5	1.25	$-1,185,702$	$1,166,594$	$-19,108$	5.14	$41,784$	318.67
v3 WETH-USDT	30	5.00	$-2,138,138$	$2,700,644$	$562,506$	5.30	$675,858$	20.15
v3 WETH-USDC	30	5.00	$-1,977,128$	$1,064,485$	$-912,643$	5.30	$-807,827$	11.48
v3 WBTC-USDC	30	5.00	$-2,221,196$	$2,462,910$	$241,714$	5.30	$359,470$	48.72

Table 2: The predicted impact of PFDA on LP markout P&L for popular Uniswap v3 pools of Table 1, normalized by volume (i.e., P&L per dollar traded).

Pool	Swap Fee (bp)	Protocol Fee (bp)	Total Volume ($)	Total P&L (bp)	Pred Total P&L with PFDA (bp)	Change (bp)
v3 WETH-USDT	5	1.25	$13,344,093,538$	-1.14	-0.97	0.18
v3 WETH-USDC	5	1.25	$40,806,008,544$	-1.51	-1.29	0.22
v3 WBTC-USDC	5	1.25	$4,987,671,333$	-0.04	0.08	0.12
v3 WETH-USDT	30	5.00	$19,405,359,331$	0.29	0.35	0.06
v3 WETH-USDC	30	5.00	$4,033,686,603$	-2.26	-2.00	0.26
v3 WBTC-USDC	30	5.00	$6,442,402,071$	0.38	0.56	0.18

markout profitability is typically on the order of ~1 bp per dollar traded.

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