Exploring Price Accuracy on Uniswap V3 in Times of Distress

Lioba Heimbach, Eric Schertenleib, Roger Wattenhofer
ETH Zurich – Distributed Computing – www.disco.ethz.ch

ACM DeFi 2022
Decentralized exchanges (DEXes)
Constant product market makers (CPMMs)
Constant product market makers (CPMMs)
Constant product market makers (CPMMs)

marginal price: \( S = \frac{y}{x} \)
Constant product market makers (CPMMs)

marginal price: $S = \frac{y}{x}$

trading along price curve
Concentrated liquidity CPMMs
Concentrated liquidity CPMMs
Concentrated liquidity CPMMs
Concentrated liquidity CPMMs

real reserves support trading up to price boundaries
Concentrated liquidity CPMMs

real reserves support trading up to price boundaries

virtual reserves used to simulate CPMM
Price movement

![Graph showing price movement with liquidity on the y-axis and price on the x-axis.]
Price movement

![Graph showing price movement with a peak at S₀ and decreasing liquidity towards 0 and ∞.](image-url)
Price movement
Stable pairs

both tokens traded in the pool are stable coins
Stable pairs

both tokens traded in the pool are stable coins
Stable pairs

both tokens traded in the pool are stable coins
UST price
Price accuracy

UST-USDC ($f = 0.01\%$)

UST-USDT ($f = 0.05\%$)
USDT price
Price accuracy

USDT-USDC ($f = 0.01\%$)  
USDT-USDC ($f = 0.05\%$)
Liquidity distribution

UST-USDC ($f = 0.01\%$)

UST-USDT ($f = 0.05\%$)
Liquidity distribution

**USDT-USDC (f = 0.01%)**

**USDT-USDC (f = 0.05%)**
Liquidity value

UST-USDC ($f = 0.01\%$)

UST-USDT ($f = 0.05\%$)
Liquidity positions
Liquidity positions

most liquidity providers remained in pools as liquidity became worthless
Summary

Uniswap V3 cannot be used as a TWAP oracle
Summary

Uniswap V3 cannot be used as a TWAP oracle

check liquidity around current Uniswap V3 price
Summary

- Uniswap V3 cannot be used as a TWAP oracle
- Check liquidity around current Uniswap V3 price
- Do not utilize Uniswap V3 as a TWAP oracle
Summary

liquidity providers lack sophistication and agility for complex market making
Summary

liquidity providers lack sophistication and agility for complex market making

raise awareness amongst liquidity providers
Summary

- Liquidity providers lack sophistication and agility for complex market making.

- Raise awareness amongst liquidity providers.

- Let the protocol move the liquidity instead of the liquidity providers.
Summary

unfavorable risk-reward ratio for liquidity providers to deposit liquidity around new price during market distress
unfavorable risk-reward ratio for liquidity providers to deposit liquidity around new price during market distress

compensate liquidity providers for taking on this risk, i.e., adopt a fee structure that would increase with volatility
Thank You!

Questions & Comments?

@liobaheimbach
hlioba@ethz.ch