Liquidity Provision Strategies on DEXs

Objective:

Explore how different liquidity provision strategies, such as AMMs, order book-based exchanges, and liquidity pools, have impacted the performance of DEXs over time. Data can be collected from various public blockchain explorers, APIs, and DeFi data aggregators.

My General approach:

Don't Repeat Yourself! I shall leverage existing visuals as much as possible from the likes of defilama, dune and flipside for much of the exploratory aspects.

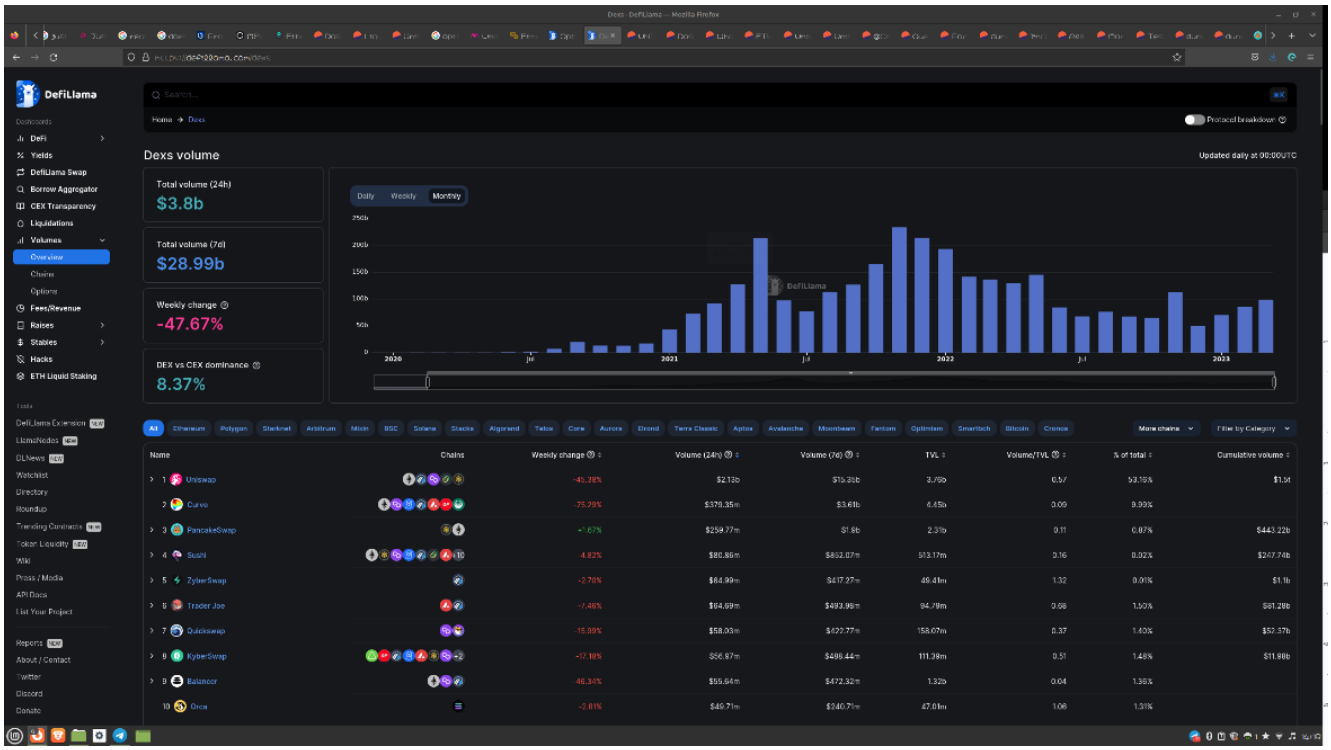
Modelling shall be pulling of data from an api, currently defilama, to model the overall metrics of specific dexes, namely volume.

In this report, I'll be using volume as a direct metric of liquidity.

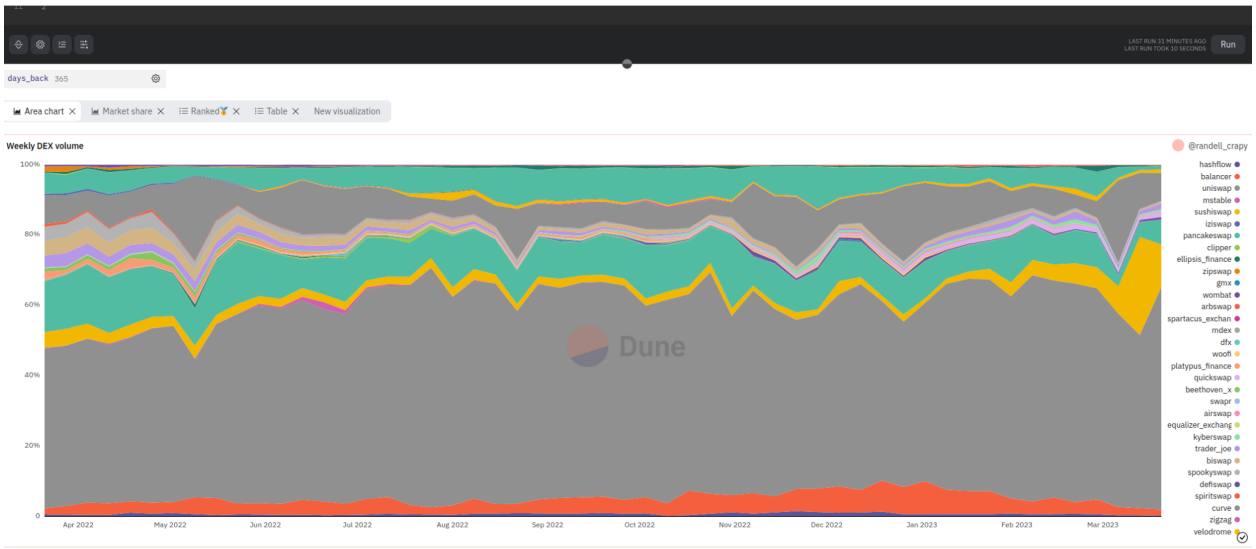
Despite this being a report on DEXs, you'll see in the next few pages that there'll be a focus on Uniswap V3, the dominating and most performant dex till now, as well as liquidity aggregators. No surprise, these are currently the 2 main strategies that have strengthened liquidity in the defi ecosystem. Therefore, I'm assuming my analysis would apply to the broader DEX ecosystem, not just uniswap v3.

Exploration:

It is important to get a grasp of the overall trend of total volumes possessed by DEXes overtime, as it can help explain some discrepancies in historical trends for other metrics.



Source: https://defillama.com/dexs



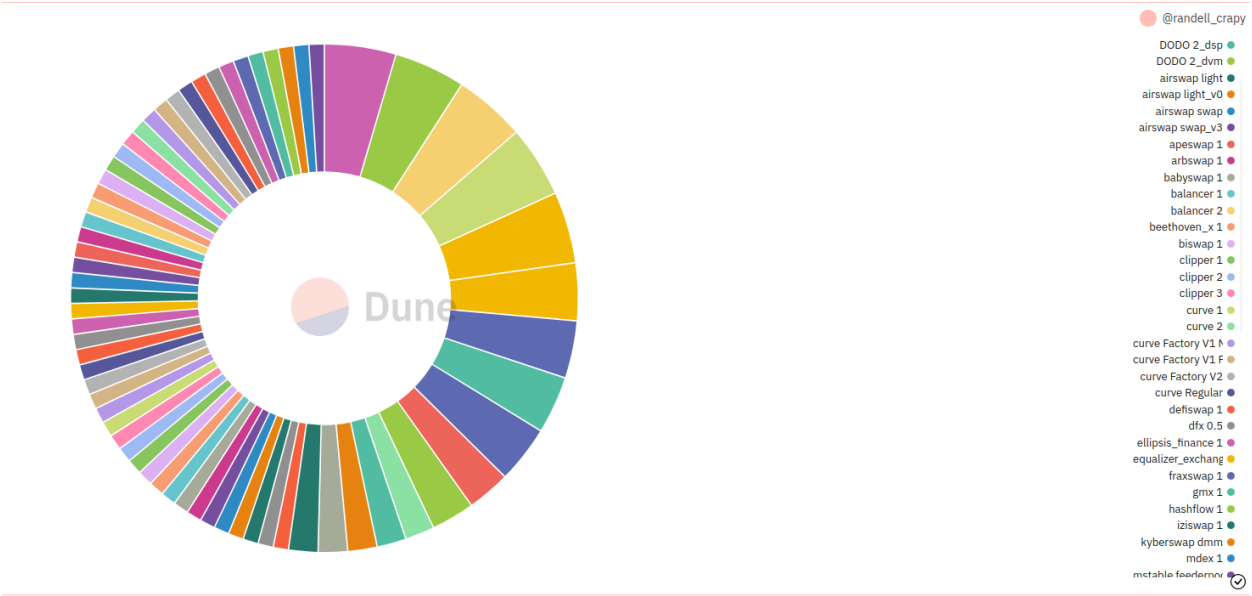
Weekly Dex Volume

Source: https://dune.com/queries/2238930

About 2021 was the roll out of uniswap v3, which till today holds the largest daily and weekly trading volumes, about 5-8 times more than its second place Curve. Curve holds the largest TVL currently, followed by uniswap, pancakeswap and balancer.

The rollout of uniswap v3 has been widely regarded to have one of the largest impacts on defi, and the graph shows a pretty steep increase in dex trading volumes, thus might be tied to uniswap v3's success of concentrated liquidity mechanism. This attracted new users and existing uniswap_v2 users to v3.

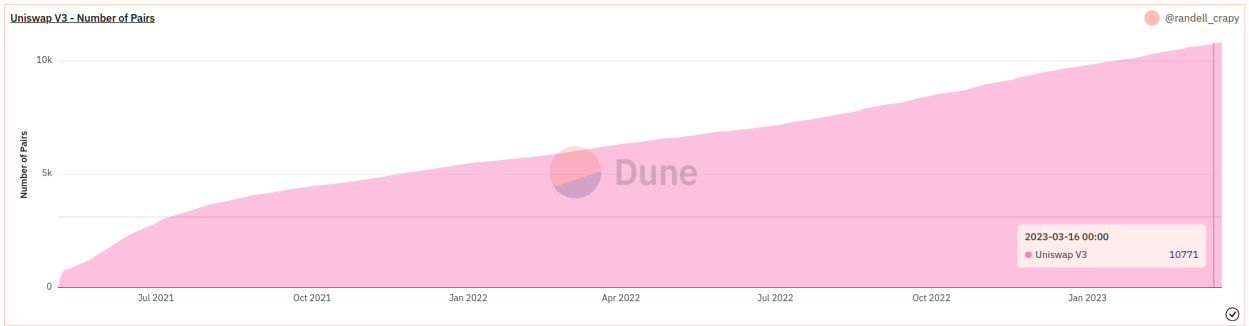
This has been roughly the status quo (uniswap dominating by trade volume percent of roughly 40-60%) from 2021 till now 2023. Only difference has been general market movements such as the rise and fall of crypto summer around may-august 2022.



Source: https://dune.com/queries/2238923/3670660

Typically for a dex to support more blockchains, it facilitates more possibilities of direct trades which helps traders consolidate their trades in fewer platforms and possibly with fewer transactions, incurring less gas and less (negative) slippage.

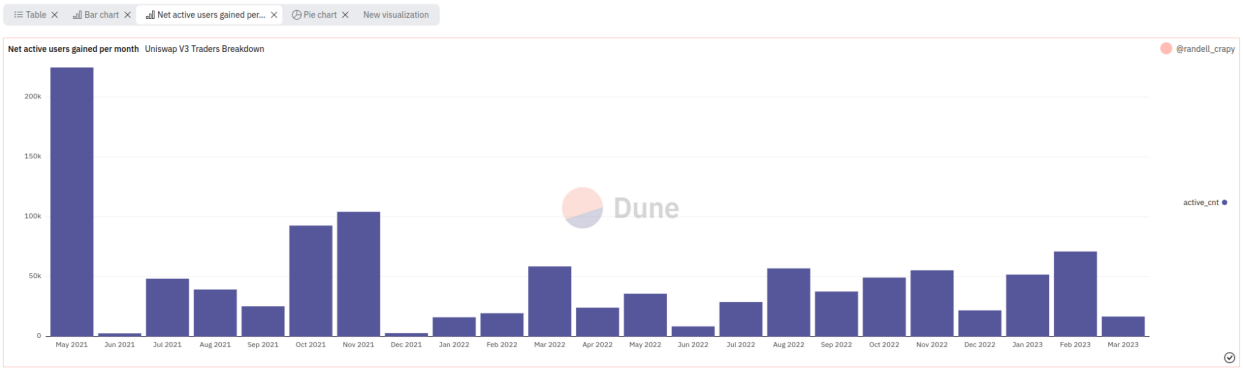
The pie chart reflects the number of (evm-compatible) chains supported by each dex_version (e.g. uniswap_v3 vs uniswap_v2). Many small, less known dexes support only 1 chain, ethereum. Meanwhile the more prominent dexes like Bancor, Uniswap V3, Curve, Sushiswap, etc. support 5 chains. These are dexes that also have one of the most trading volumes today too.



Source: https://dune.com/queries/2241598/3675234

Uniswap V3 has been showing a mostly linear increase in the number of unique trading pairs, which is a good sign in terms of performance of a dex as it shows the dex has been growing in popularity and reputation gradually to have more swap options supplied by liquidity providers.

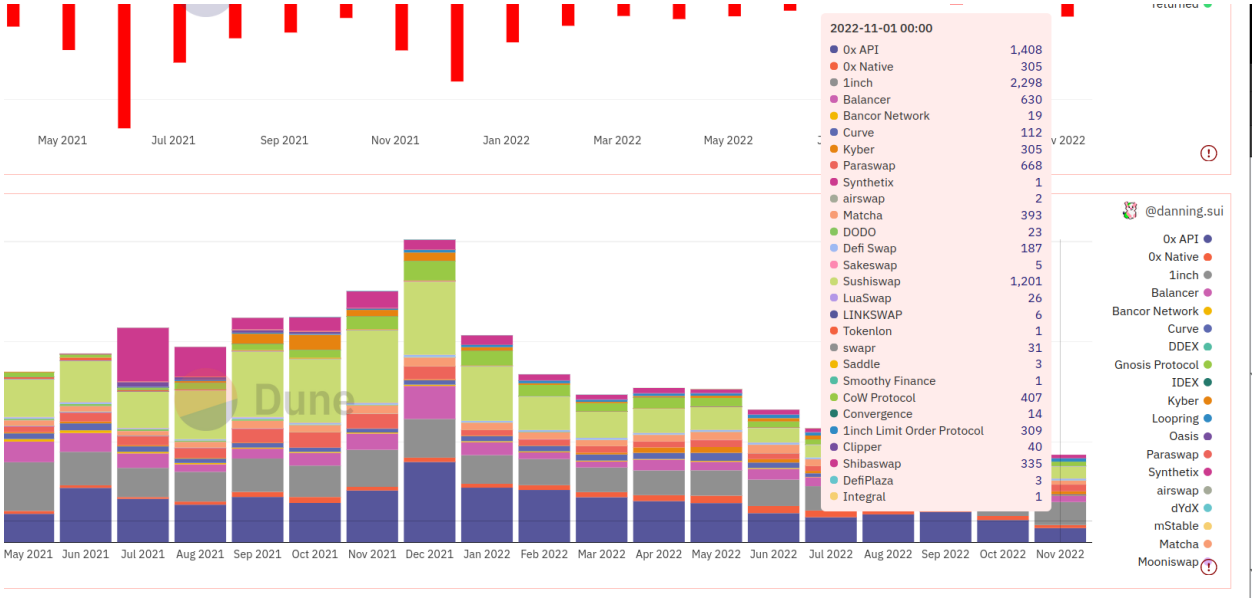
Active user/trader counts are importantly indicators of the performance of any dex. A high enough count incentives more liquidity provision in dex pools, and buffers a trader from slippage issues due to the associated higher trading volumes.



Source: https://dune.com/queries/2241065

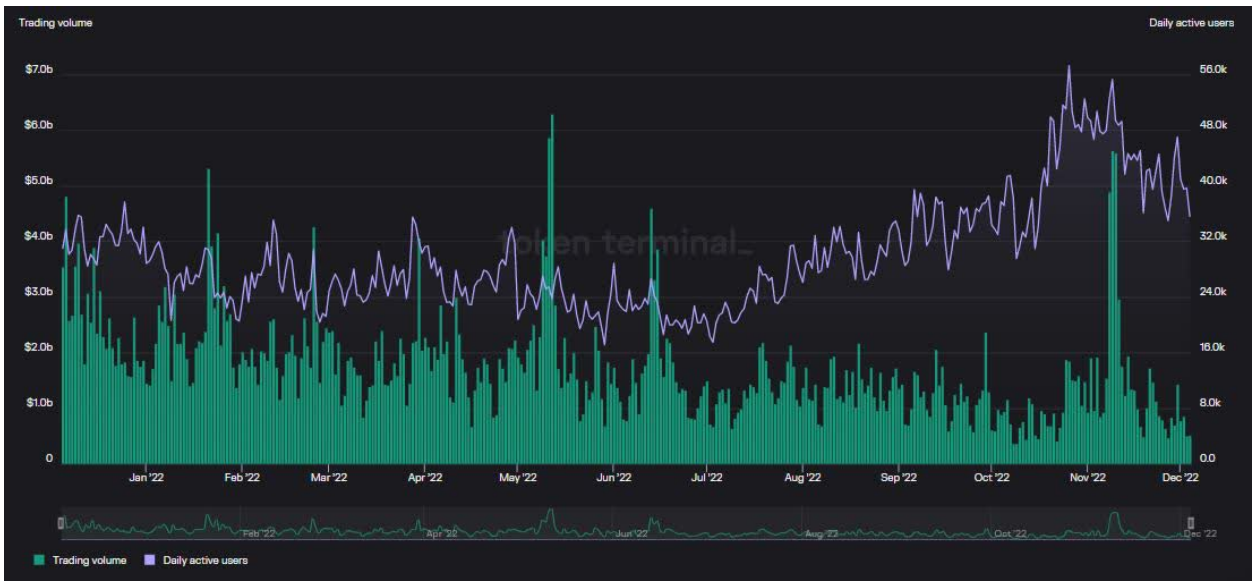
Source: https://dune.com/queries/2240061/3672756

The first graph shows that the monthly active users (MAU) for uniswap v3 has been steady after its initial launch burst in May 2021. There's a rough mean of 40k MAU. The upticks in MAU do correspond to large scale financial events like crypto summer, CEX collapses. The second graph shows more clearly however that the churn rate of uniswap v3 traders is usually significantly higher than new traders, which isn't a good sign for the best performing dex in terms of user acquisition. However, trading volume hasn't been growing or dropping significantly either, thus hinting that these users are still contributing to uniswap's trading volume perhaps in another way. The following graph supports this idea.



Source: https://dune.com/queries/111436/226341

We can see that those who left as a direct uniswap user end up in aggregators. We'll go into further detail about the contributions of aggregators to liquidity later.

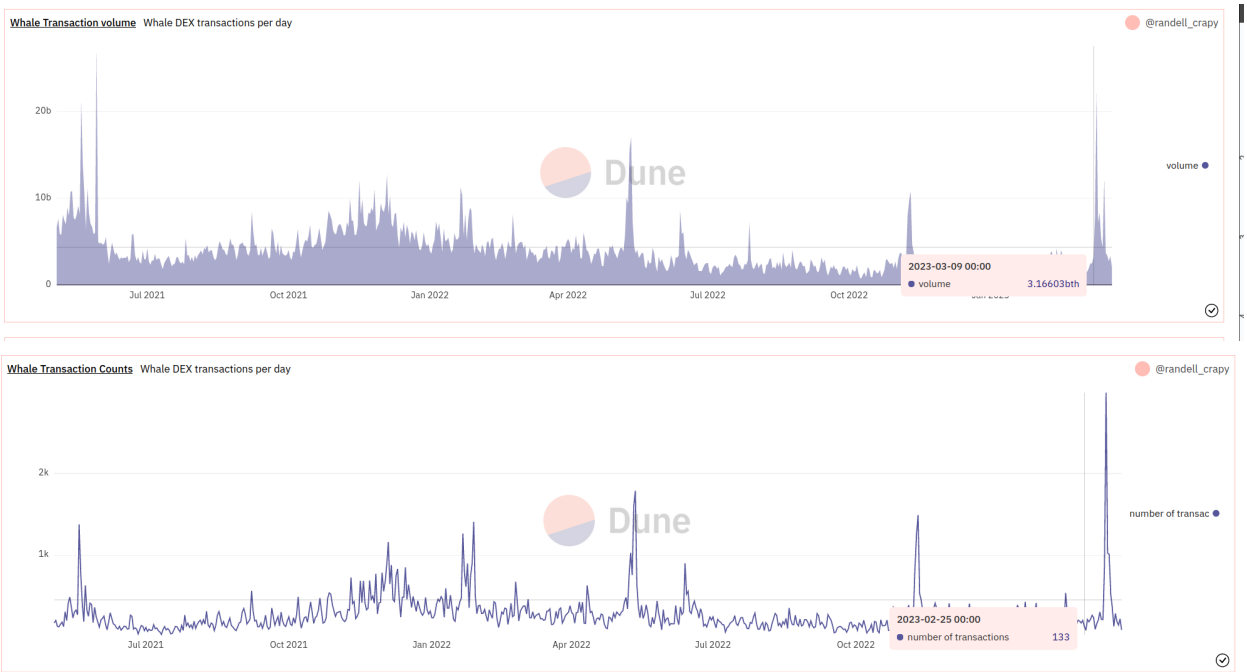


Source: https://seekingalpha.com/article/4562660-uniswap-token-governance-no-longer-good-enough

We can see that the uniswap trading volume and its daily active users are somewhat positively correlated.

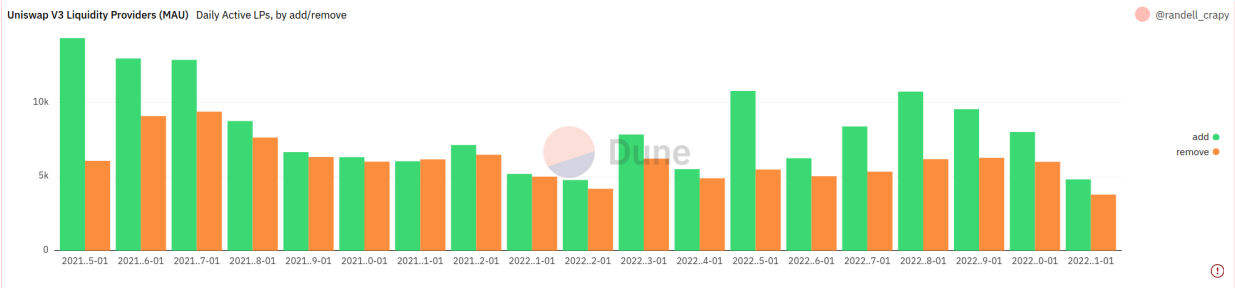
We can see that at least for the time period of FTX's collapse where uniswap trading volume rocketed, UNI governance price is still highly correlated to the main 2 tokens ETH and BTC, and not significantly correlated with trading volume.

Dexes' trading volumes should not be heavily dominated by a small proportion of the users of the platform. Therefore it's important to note the liquidity risk posed by the proportion of trades that are of "whale" proportions (self-defined >= USD$1,000,000).



Source: https://dune.com/queries/2241639/3675302

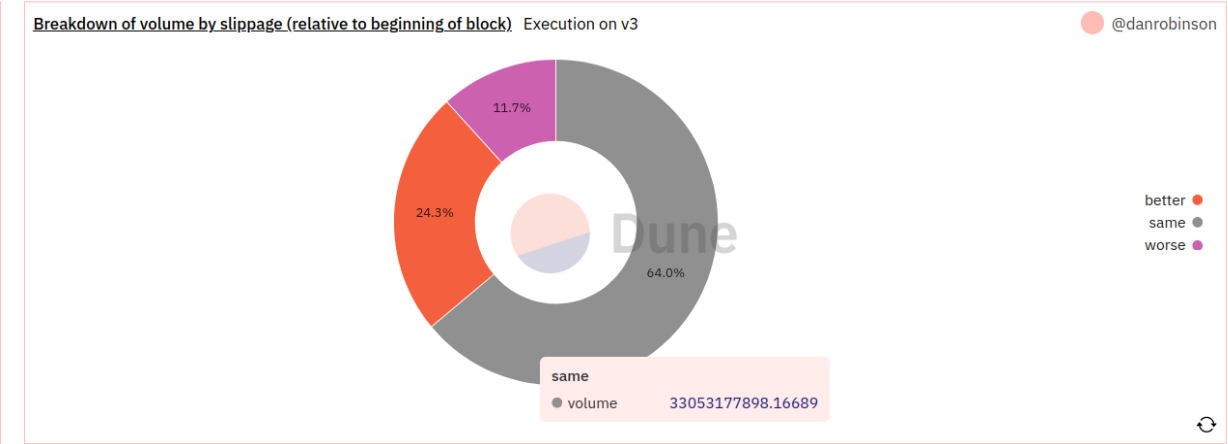
Unfortunately, even on a daily basis whales still constitute a large portion of the trade volumes across the dexes. Macroeconomic factors aside, there is sufficient risk that a whale that liquidates its positions would cause a major "splash" to price stability in a dex.



Source: https://dune.com/queries/2241680/3675370

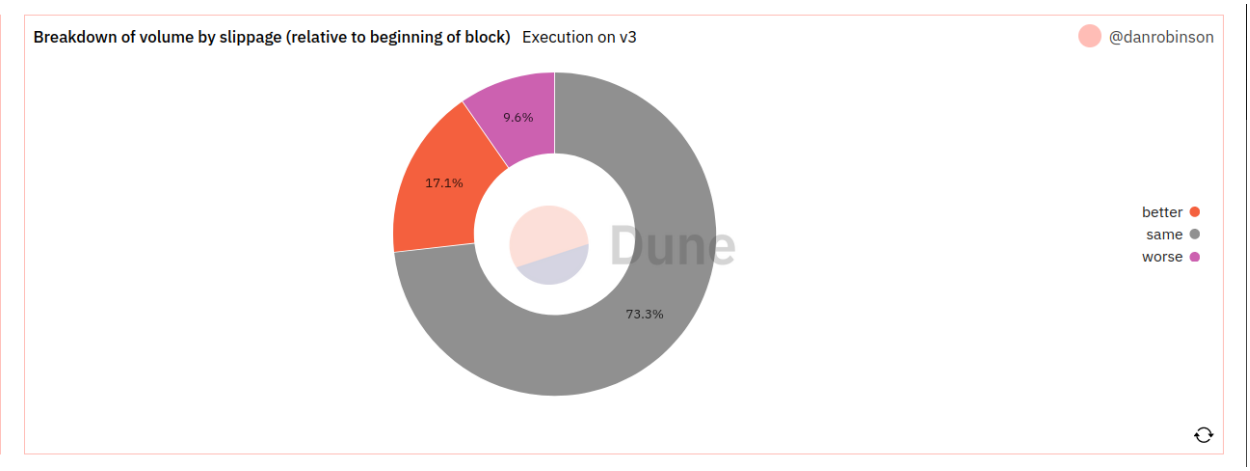
In terms of liquidity providers, we still see a steady net growth in monthly active liquidity providers too, a good sign of uniswap v3's liquidity as we would want most of the liquidity to be distributed among more people as a form of risk mitigation.

Most DEXs are still prone to slippage, despite measures to handle sandwich attacks like the use of flashbots.



Source: https://dune.com/danrobinson/v3-execution?interval_t56460=2+month

The graph above represents uniswap v3's cumulated slippage in the past month.



This graph shows the accumulated slippage in the past year. Negative slippage is better overall likely because of the recent spike in trading activity in this month compared to a relatively low volume generally over the year. Perhaps this may imply sudden changes in volume can lead to worst negative slippage.

Effects of specific liquidity mechanisms

Uniswap v3's JIT MEV liquidity

JIT liquidity is a special form of liquidity provision where an LP mints and burns a concentrated position immediately before and after a swap. They are very rare, with a little over 8,000 JIT transactions between May 2021 and July 2022, and JIT liquidity accounts for a fraction of a percent of Uniswap v3's total liquidity provided.

Insights are mainly drawn from this dashboard from ChainsightAnalytics.

JIT Liquidity bot profits

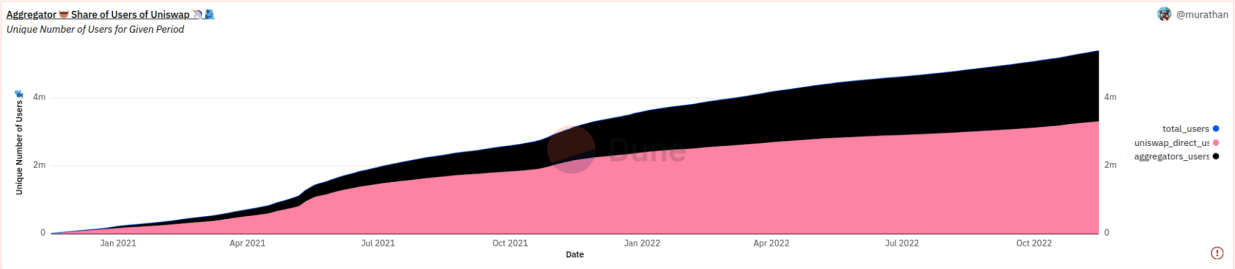
It has been proven to reduce the price impact of a very large trade, which would be useful for institutional traders or whales. However as we can see from the graph, the cumulative scale of impact is only in the millions in comparison to the billions of weekly trading volume, thus at the moment it's not a significant contributor to liquidity for the uniswap v3 dex.

Aggregators

DEX Aggregators are increasing their popularity in the DeFi ecosystem by offering users the best prices among all AMMs. All of the visuals came from @murathan, a dune analytics user. I'll be pointing out some key highlights from his dashboard: https://dune.com/randell_crapy/tryagain

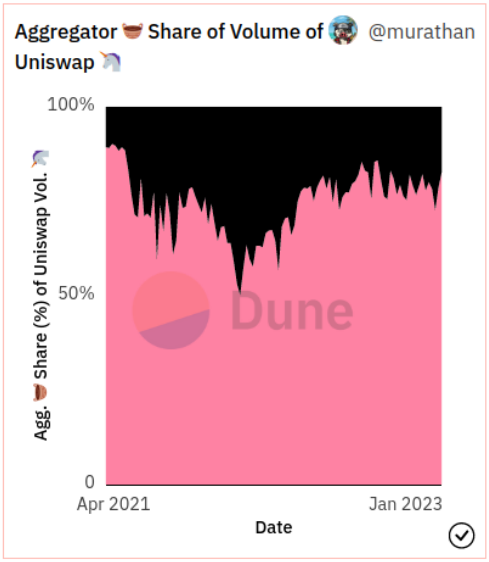
Dex aggregators have been around since 2021 or even later, and they've definitely been a go-to platform to conduct trades due to the convenience provided by them.

In theory, by lowering the barriers to entry to transact cross-dex, it lowers the number of transactions needed to cross, and some aggregators can find trades that minimise slippage issues. Therefore, making trading easier and improving the liquidity among dexes.



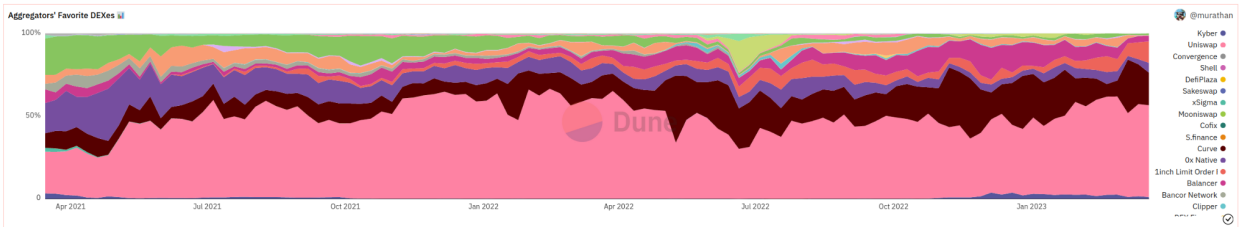
User distribution between direct uniswap users and aggregator users (excluding Matcha)

We can see that aggregators not only have stood the test of time (in web3 2 years is very long), but also about 35% of users that interact with uniswap v3 goes through an aggregator to do so, corroborating the popularity.



Aggregator share of volume

Aggregators have contributed significantly to the trading volume of uniswap v3 throughout the 2 years as well. Despite hovering about 25% of the trade volume, the proportion of users increased throughout the years, which could mean more new (less OG, more casual) traders are on-ramped through these aggregators, or that direct uniswap users are moving to aggregators (likely the latter as corroborated by the steadily lowering MAU).



Distribution of trade volume over the dexes attributed to aggregators

However, despite aggregators providing the ease to bridge assets across various dexes, liquidity mainly remains in uniswap v3 primarily, with today's proportion of liquidity at 41.6%. June - July 2022 saw a sudden shift to 1inch's AMM Mooniswap, but it did not last beyond that.

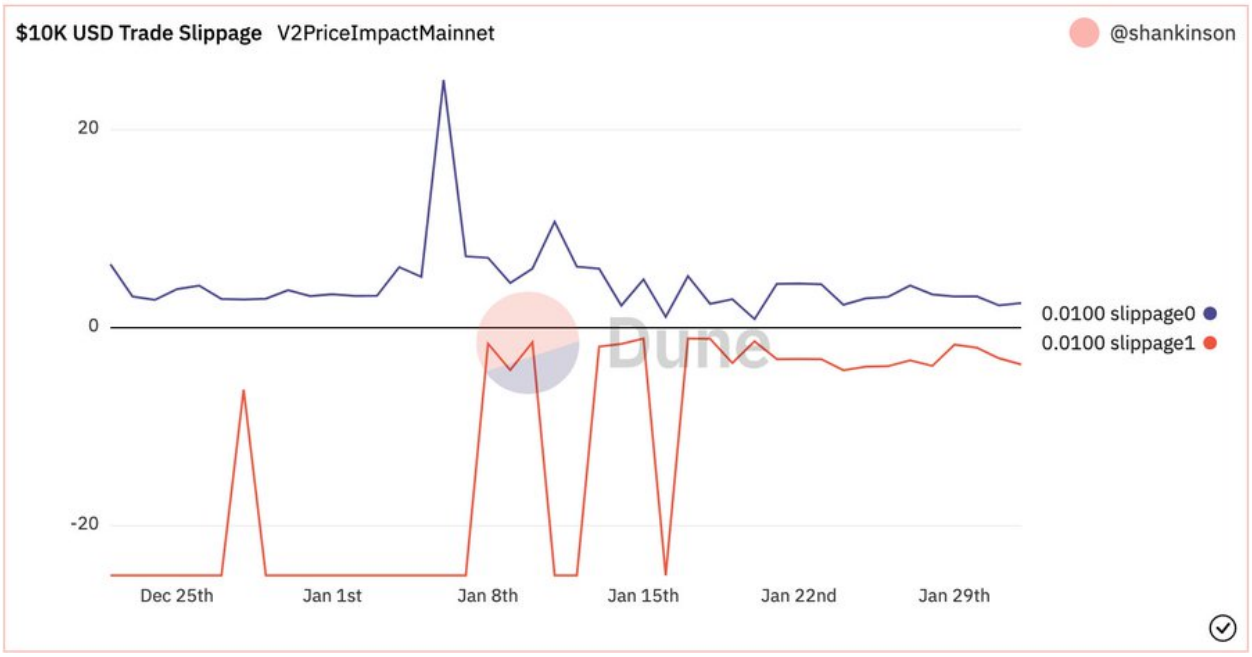
Vaults

Popularised by the likes of yearn.finance, staking one's tokens into a vault has become a defi version of passive robo-trading. Instead of letting your tokens hodl in your wallet, you could stake your tokens in a vault that employs a certain trading strategy, and realise yield by unstaking after the lock-in period. APYs from yearn vaults range from 0% to 30-50%.

Since the tokens vested into these vaults are used for trading, typically in dexes, they do play a part in offering up some liquidity to the dexes they trade in.

We'll take a closer look at one vault protocol that's gaining popularity in recent times: arrakis. They've provided a dune dashboard and further elaborated on their vault strategy and efficiency in this tweet.

For the LP they were trialling on, they've facilitated 6.9% of the volume



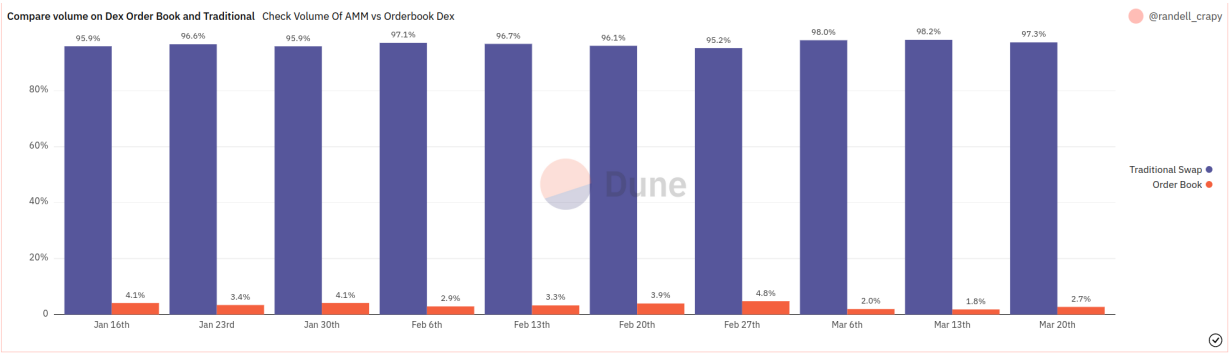
Their strategy has proven to dampen the price impact of 10k USD trades from 6% to 2.4%. Thus they've definitely improved the liquidity provision for uniswap v3 considerably given that it's a pilot.

Vaults are a means, but definitely not a really significant means of providing liquidity for dexes. This is because their transactions account for single digit percentage, or even sub 1% of trading volumes. For the time being, there's still overall distrust over locking one's tokens in a third party's vault due to the potentially significant counterparty risks undisclosed/not apparent to users, especially after the crackdown on the likes of FTX, voyager and Celsius tokens, as well as scam projects like SafeMoon (oh the irony~).

Order book based dex

Uniswap v3's success I believe was largely due to the concentrated liquidity concept that's inspired by traditional market's order-book based systems. In very recent months, a handful of protocols had a go with building a dex in which its core is a decentralised order-book!

Percentage trading volume of order books and traditional swap AMMs
Source: https://dune.com/queries/2241537/3675146?d=11

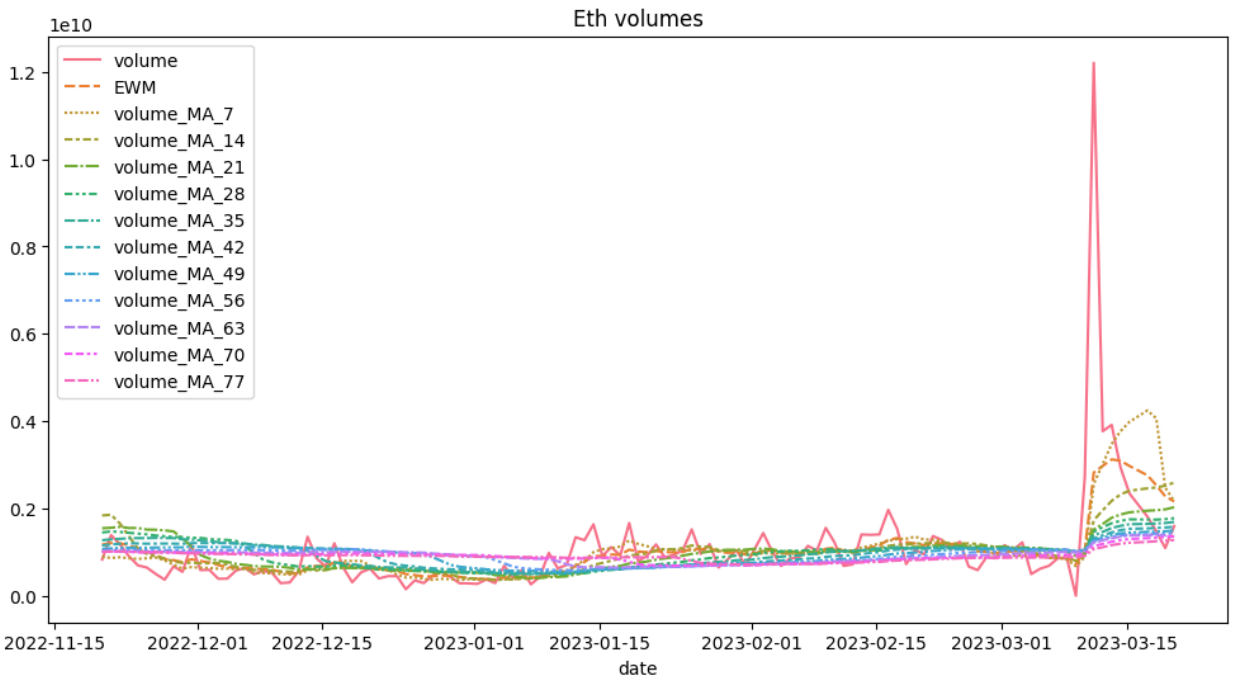


Percentage trading volume of order books and traditional swap AMMs over past 3 months
Source: https://dune.com/queries/2241537/3675146?d=11

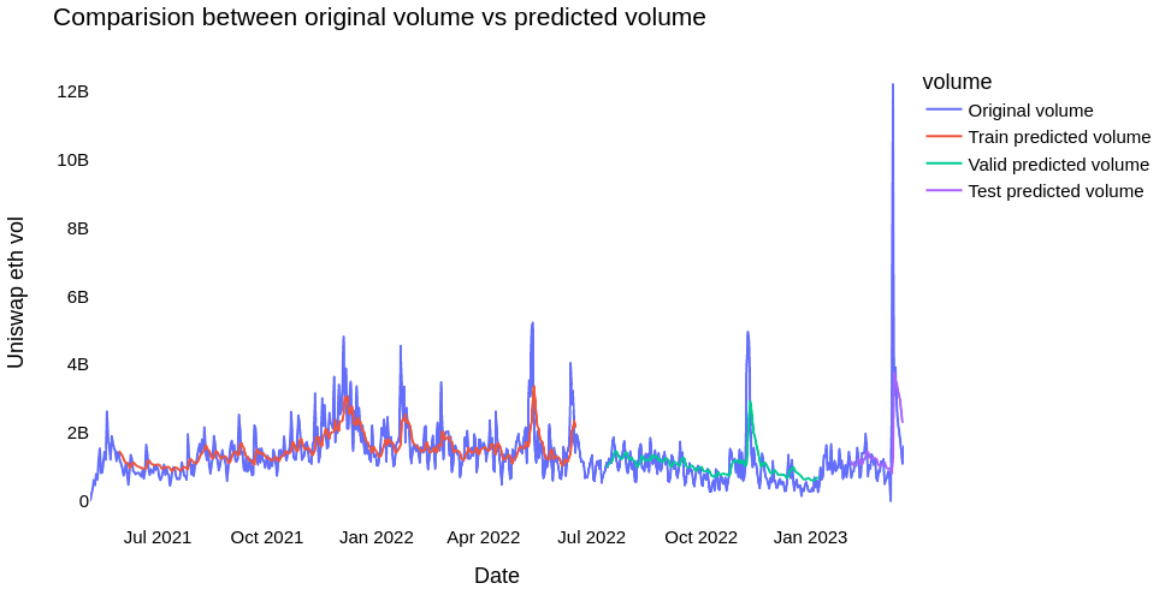
Unfortunately, they still constitute a very small portion of the trading volumes compared to traditional dexes. That is not to say their liquidity provisioning might be better, that would be an interesting angle to investigate.

Modelling

This would be a quick attempt to figure out predictability of daily volumes, particularly of uniswap v3.



By creating multiple rolling windows on the previous 3 months, we can see that generally there's likely a slightly upward momentum of daily trading activity. This is corroborated by recent macroeconomic affairs such as the collapse of multiple prominent banks and US's "money printing" effect. Therefore these simple momentum metrics can forecast this longer term trend.



For shorter-medium term trends, I've decided to make use of LSTM model to understand what well it could model daily volumes. From the graph above, it seems to predict the general short term trends relatively well for different time periods. I would not recommend using this as an exact predictor of daily volume, but just short to medium term trends, this has shown to be accurate enough.

Conclusion

I've explored multiple prominent liquidity provisioning strategies in this report. In my opinion, a dex is ideal if price impacts, even by the wealthy, are insignificant. We may reach that point when we onboard more users to web3, naturally mitigating these liquidity risks and whale splashes.

However, given web3's current lack of real-world utility with respect to traditional finance and existing web2 solutions, this organic boost in DEXs performance is still pretty far away.

In the near term, nudging traders from traditional finance markets or CEXs to DEXs can be achieved partially by these LP strategies. Aggregators and concentrated liquidity strategy from uniswap v3 have played major roles, though i foresee in time to come perhaps the order book and vaults will become significant mainstays and contributors to the health of DEXs.