



Uncovering DeFi Fundamentals: Decentralized Exchanges

August 2022



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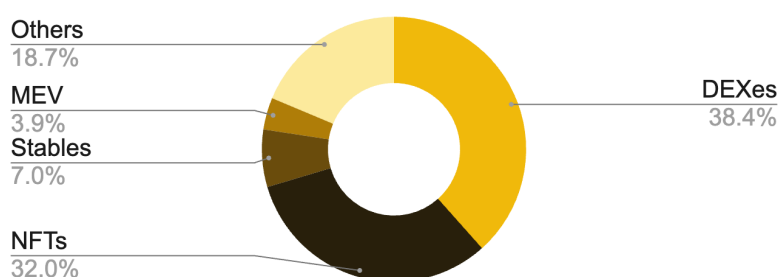
Key Takeaways

- ❖ Most trades today are still conducted through centralized exchanges. The DEX/CEX ratio rose from 6.8% to 15.3% in 2021 but has declined from its peak of 16.5% in January 2022 to 13.0% in July 2022. The year-to-date fall is likely contributed by an overall decline in DeFi activity this year. Nonetheless, the DEX/CEX ratio today is still nearly double that of the beginning of 2021.
- ❖ Token emissions are pivotal to the growth and operations of DEXes as they serve to incentivize liquidity providers to provide liquidity to the platform. However, native tokens with minimal utility tend to see the value of the tokens erode. Several DEXes such as PancakeSwap, Curve, Balancer, and Trader Joe have increased the utility of their tokens and/or introduced locking mechanisms to reduce mercenary selling pressure.
- ❖ We analyzed the financial data of six DEXes in this report - Uniswap, PancakeSwap, Curve, Balancer, Trader Joe, and Serum. None of the DEXes are profitable after accounting for token emissions related to liquidity mining incentives. Uniswap comes closest to turning a profit if it passes its fee switch proposal, ceteris paribus. While being loss-making is not uncommon and is similar to the playbook of early-stage startups that operate at a loss to bootstrap growth, DEXes should consider taking steps to minimize cash burn and to achieve operating profit.
- ❖ In terms of valuation ratios, PancakeSwap generally fared better than average across most of the metrics analyzed. In terms of other financial ratios such as “Average Revenue per User” and “Return on TVL”, Uniswap, Curve, and Balancer generally performed better.
- ❖ Looking ahead, competition between DEXes and the disruptive threat of aggregators will likely remain high. DEXes should focus on winning over liquidity providers to deepen the liquidity of their trading pools. Additionally, DEXes can explore different ways to increase user stickiness and platform loyalty (e.g. token distribution, better user experience, competitive fees etc.).
- ❖ In a positive sign, we have witnessed the amalgamation of previously disparate worlds of DeFi and NFTs in the form of cross-adoption of technologies (e.g. the adoption of the AMM model by SudoAMM) and cross-vertical acquisitions (e.g. the acquisition of Genie by Uniswap) over the past year.

Market Landscape

Decentralized exchanges (“DEXes”) are a cornerstone of decentralized finance (“DeFi”) and are one of the most widely used decentralized applications (“dApps”) today. DEXes facilitate trading of crypto assets without the need for an intermediary by employing smart contracts to settle transactions. Using Ethereum gas consumption as a gauge of transaction activity, DEXes account for the largest share of gas consumed on the Ethereum blockchain in the first half of 2022.

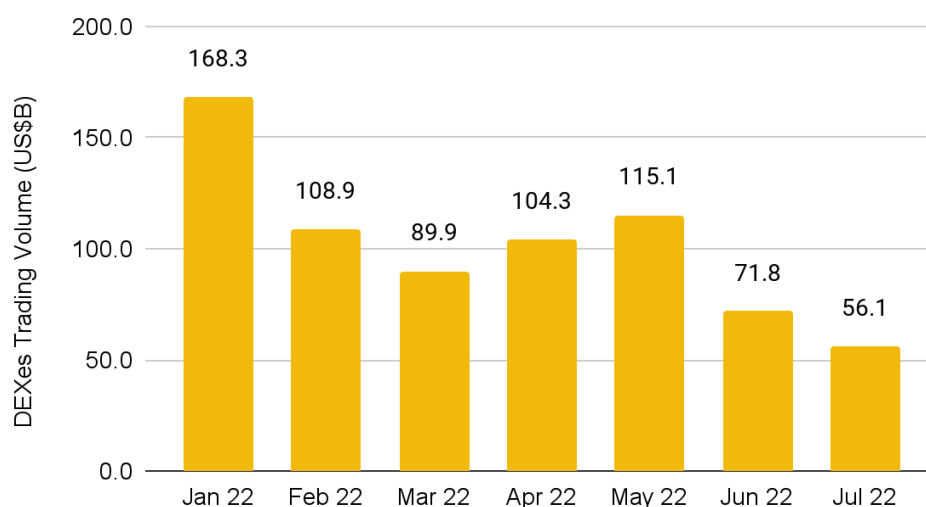
Figure 1: DEXes had the highest Ethereum gas consumption (1H 2022)



Source: *gasguzzlers.wtf*, Nansen, Binance Research

DEXes recorded slightly over US\$714B in trading volume year-to-date as of end-July 2022. **Monthly trading volume has generally been on a downtrend since the start of the year as crypto market activity fell.** The lowest monthly trading volume year-to-date was recorded in July 2022 with US\$56.1B of trading volume. This represents a significant decline of over 66% in trading volume as compared to the start of the year in January 2022.

Figure 2: Trading volume of DEXes has been on a downtrend year-to-date

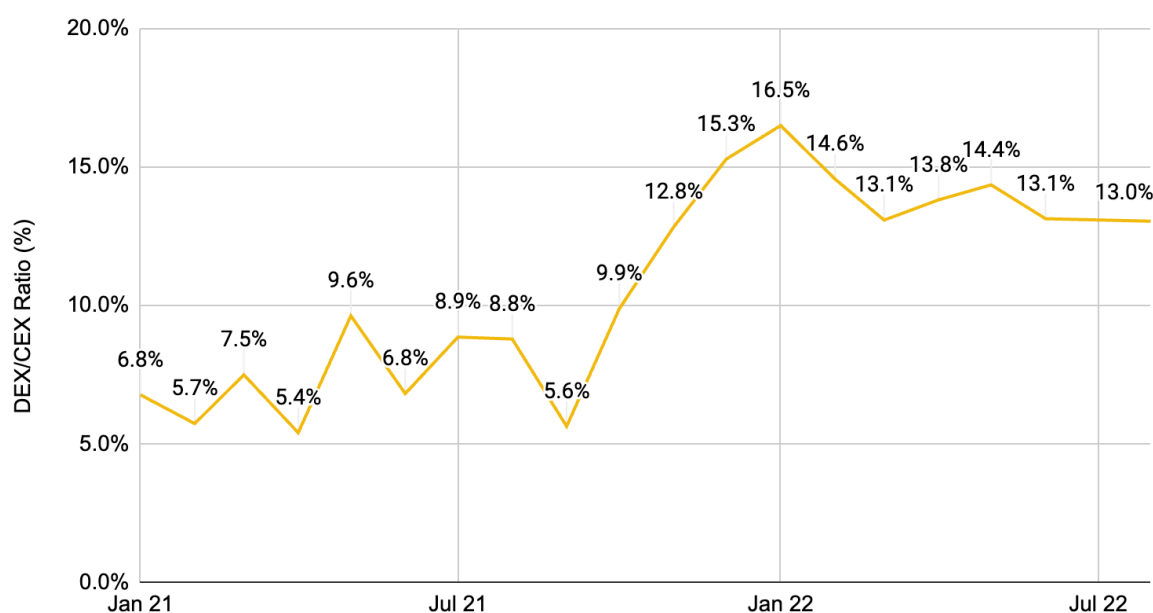


Source: *Binance Central Data Analytics Team*, Binance Research

By offering a non-custodial and more transparent alternative, DEXes have been competing with centralized exchanges (“CEXes”) for market share. DEXes appeal to users who value control over their assets, and users who subscribe to the DeFi ideal of decentralization. Moreover, the permissionless nature of DEXes allows LPs to provide liquidity and create new pools with lower barriers to entry. Projects can work with DEXes to launch their tokens on the respective platforms.

Today, while DEXes have their fair share of adoption, **CEXes continue to command the lion’s share of total trading volume.** The DEX/CEX ratio, which measures the trading volume of DEXes relative to CEXes, increased from 6.8% to 15.3% over 2021 but has declined from its peak of 16.5% in January 2022 to 13.0% in July 2022. The year-to-date decline is likely contributed by an overall fall in DeFi activity across the board. Nonetheless, the DEX/CEX ratio today is still nearly double that of the beginning of 2021. It remains to be seen whether this trend will reverse. Interestingly, Changpeng Zhao (“CZ”), the CEO of Binance, mentioned in a recent interview that “decentralized exchanges will be bigger than centralized exchanges” in five to ten years.¹

Figure 3: DEX / CEX ratio rose over 2021 but has decreased since the start of the year

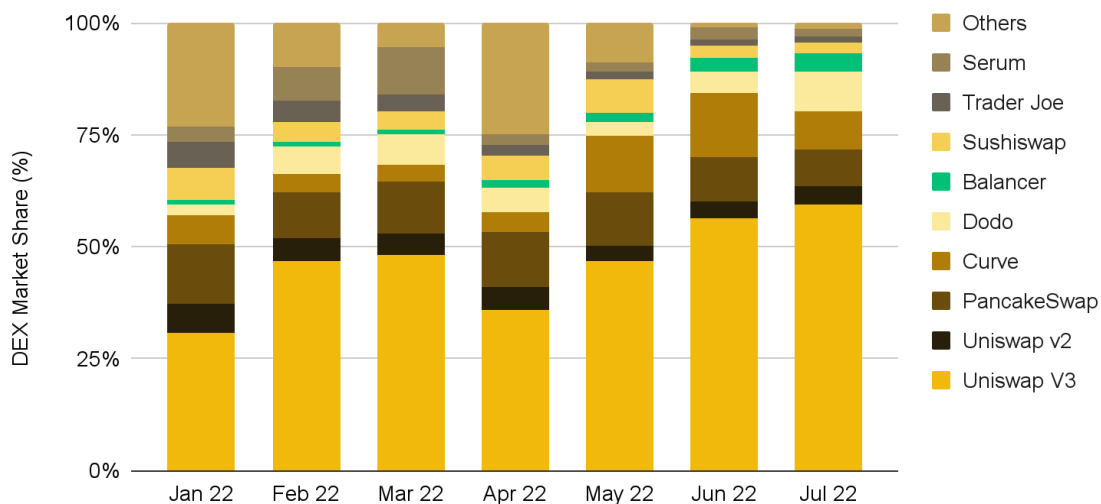


Source: The Block, Binance Research

Competition within the DEXes ecosystem is fierce, with numerous players competing for a piece of the pie. Nonetheless, Uniswap (V2 and V3) has demonstrated strength and has consistently maintained its lead. **As of end-July 2022, Uniswap has over 60% market share in the DEX space, significantly higher than any other DEX.** In terms of average market share year-to-date, PancakeSwap comes next with a monthly average of ~11%

market share, contributed by its stronghold within the BNB ecosystem. For context, PancakeSwap is the leading dApp on the BNB chain with over 56% dominance in terms of total value locked (“TVL”).²

Figure 4: Uniswap leads the pack in terms of DEX market share



Source: Binance Central Data Analytics Team, Binance Research

DEXes Analytical Framework

The Evolution of DeFi and Framework for Evaluating DEXes

DeFi has evolved significantly since the DeFi summer of two years ago. Apart from the developmental progress of dApps, users' trading behavior and how they evaluate DEXes have changed over time.

In the initial stages of DeFi, yields were all that users were focused on. The general mantra seemed to be “the higher, the better”. At the height of DeFi summer, annual percentage yields (“APYs”) of a few thousand percent were not uncommon, and this phase was characterized by money chasing after high yields. Unsurprisingly, this was not sustainable - many of the tokens plunged in prices after liquidity dried up.

As demand for astronomically high APYs waned, users needed another way to compare and evaluate the health of a protocol. This ushered in the era of TVL, which seemed to be the perfect metric to gauge demand for the protocol given that it represents the amount of assets deposited. Ease of TVL data availability also contributed to the popularity of the metric among retail users. Protocols with the highest TVLs were seen as leaders in their respective fields, and gave the sense of being “too big to fail”. However, TVL has its own drawback - protocols can boost their own TVL by attracting assets through inflationary token incentives. Moreover, a protocol can show up on the TVL scoreboard for a short period of time but drop off when token incentives run out or if the protocol fails to attract sustainable demand for its services.

Today, investors are increasingly focused on fundamentals. Vanity metrics such as APYs and TVL have taken a back seat and the sustainability of business models are coming to the fore. **While many DeFi projects have generated strong revenue, there has been increased scrutiny on the profitability and fee accrual mechanism** of these projects as more focus is placed on whether the projects can tide through the current bear market and as investors analyze how returns flow to token holders.

This leads us to our framework for evaluating DEXes in the upcoming sections. We focus our analysis on fundamentals of the DEXes and also take a look at quantitative data. The evaluation framework includes:

- ❖ **DEX Overview:** High-level information about the protocol
- ❖ **Tokenomics:** Supply and demand of tokens, including utility, and token distribution
- ❖ **Financials:** Income statement and profitability analysis
- ❖ **Valuation:** Valuation ratios such as Price / Sales, and Market Capitalization / TVL

We evaluate profitability of DEXes by netting off the trading fees to liquidity providers, as well as token emissions related to liquidity mining / staking rewards. The latter can be thought of as operational expenses (eg. marketing expenses) that are necessary to run the protocol, without which the DEX would likely not be operationally viable.

A Note about Tokenomics...

Before launching into a discussion about each specific DEX, we wanted to take a moment to share some observations about the tokenomics of DEXes. Native DEX tokens are pivotal in incentivizing liquidity provision on the platform by providing additional returns to liquidity providers who park their assets with the respective DEXes. Without the additional token rewards, liquidity providers may not be sufficiently incentivized by trading fees alone to deposit their assets with the DEX. As such, **token emissions contribute to the operations and sustainability of DEXes as a form of liquidity incentive scheme.**

However, the challenge that comes with incentivizing liquidity provision through token emissions is that DEXes often see the value of their native tokens erode. This is especially true for tokens with minimal utility as liquidity providers without a sufficient reason to hold the token would sell the native tokens. Moreover, mercenary capital may come into the DEX to farm rewards just to sell them on the market before moving on after the capital dries up. An increase in selling pressure would translate into falling token prices, which then results in requiring more native tokens to be paid out to maintain the level of rewards. Ultimately, this can be attributed to a misalignment of interests between token holders (who are interested in the longevity of the DEX) and liquidity providers (who are typically interested in yields).

A corresponding observation we have made in our analysis is the increase in the number of DEXes trying to find ways to increase the utility of their tokens, or to put in place some form of locking mechanism. In our view, this is positive and is a critical development in DEX tokenomics to reduce mercenary selling pressure. Where relevant, we highlight a few of these developments in the following DEX-specific sections.

DEXes Summary

	Uniswap V3	Uniswap V2	PancakeSwap	Curve	Balancer	Trader Joe	Serum
Blockchains	<ul style="list-style-type: none"> • Ethereum • Polygon • Optimism • Arbitrum • Celo • Gnosis • Moonbeam 		<ul style="list-style-type: none"> • BNB Chain 	<ul style="list-style-type: none"> • Ethereum • Arbitrum • Aurora • Avalanche • Fantom • Harmony • Optimism • Polygon • xDai • Moonbeam • Gnosis 	<ul style="list-style-type: none"> • Ethereum • Polygon • Arbitrum 	<ul style="list-style-type: none"> • Avalanche 	<ul style="list-style-type: none"> • Solana
TVL	US\$4.94B	US\$1.61B	US\$3.33B	US\$6.27B	US\$1.58B	US\$229M	US\$114M
Circulating Market Cap	US\$6.7B		US\$617M	US\$720M	US\$273M	US\$117M	US\$279M
Fully Diluted Valuation	US\$8.9B		US\$3.2B	US\$4.6B	US\$657M	US\$179M	US\$10.7B
No. of Pairs	811	2,497	4,284	76	73	305	344
Top Traded Pairs (24H)	<ul style="list-style-type: none"> • USDC/WETH • USDC/USDT • WBTC/WETH 	<ul style="list-style-type: none"> • USDC/WETH • HDRN/WETH • CWEB/USDC 	<ul style="list-style-type: none"> • WBNB/BUSD • WBNB/USDT • GHNY/WBNB 	<ul style="list-style-type: none"> • USDC/USDT • DAI/USDC • DAI/USDT 	<ul style="list-style-type: none"> • USDT/USDC • LDO/ETH • USDC/ETH 	<ul style="list-style-type: none"> • WAVAX/USDC • WETH/WAVAX • WAVAX/USDT 	<ul style="list-style-type: none"> • SOL/USDC • MSOL/USDC • WETH/USDC
Swap Fees (Fee Split)	0.01% - 1% (100% LPs)	0.30% (100% LPs)	0.25% (68% LPs, 12% Treasury; 20% buy and burn)	0.04% (50% LPs, 50% veCRV holders)	0.0001% - 10% (50% LPs, 37.5% veBAL holders, 12.5% DAO)	0.30% (~83% LPs, ~17% protocol fees)	0.04% (20% to project host, 80% buy and hold)

Source: DEXes' website, Defi Llama, Coinmarketcap, CoinGecko, as of 12 August 2022

Uniswap

Since its launch in 2018, Uniswap has introduced several variations and developments to the protocol. The first version, Uniswap V1, only offered ETH-ERC20 pairs. While having a constant numeraire in ETH allows for ease of comparison of token values, a user who wants to swap between ERC20 tokens will incur higher costs and slippage as it is needed to bridge between ETH. Uniswap V2 overcame this by allowing ERC20-ERC20 swaps without mandatory exposure to ETH. The launch of Uniswap V3 ushered in novel features such as concentrated liquidity and flexible fee structures that have differentiated Uniswap from its competitors. In particular, **concentrated liquidity improves capital efficiency by allowing LPs more control over the price ranges in which their capital is used.**

Over time, Uniswap has continued to innovate and develop its platform in response to market needs and demands. This is a positive sign and has contributed to their market leader position in the DEX ecosystem. To provide further perspective, Uniswap trade volume today is nearly that of Coinbase. Specifically, since January 2022, Uniswap's market share of volume relative to Coinbase has surged from 27% to nearly 50% as of mid-July 2022.³

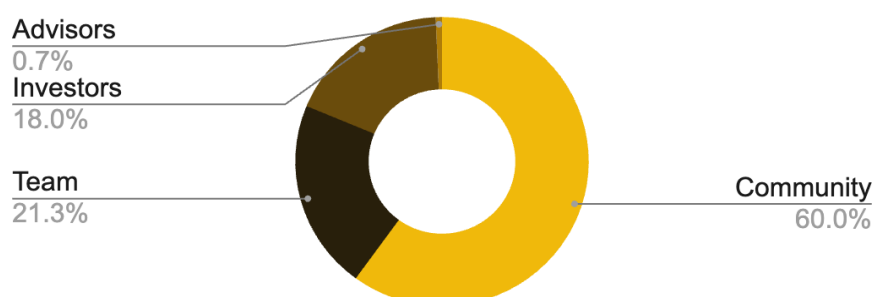
UNI Tokenomics

Uniswap introduced their native governance token UNI in September 2020 and airdropped the UNI token to early adopters of the protocol. UNI token holders can participate in protocol governance and vote for changes to the protocol.

UNI Supply

1 billion UNI tokens were minted at genesis and will vest over 4 years (starting from 2020). The initial allocations were split amongst community members, team, investors, and advisors. After 4 years, there will be a perpetual annual inflation rate of 2%.⁴

Figure 5: Majority of UNI's initial supply was allocated to the community



Source: Uniswap, Binance Research

UNI Utility

- ❖ **Governance:** UNI token holders can participate in the governance of the protocol and vote on development and upgrade proposals.
- ❖ **UNI Community Treasury:** UNI token holders can vote to allocate UNI towards grants, strategic partnerships, governance initiatives, additional liquidity mining pools, and other programs.
- ❖ **Protocol Fee Switch:** Currently, there are no protocol fees. However, UNI holders can vote for protocol fees to be turned on in the future.

View on Tokenomics

At the moment, the primary use case for the UNI token is protocol governance. Notably, the lack of a protocol fee means that the UNI token does not accrue any direct value from transactions currently. The fee switch mechanism has been a topic of debate among the community. If activated, protocol revenue will be distributed to UNI token holders. For Uniswap V2, protocol fee will be 0.05% when switched on, reducing liquidity provider fee from 0.30% to 0.25%. For Uniswap V3, a fraction of swap fees (up to 25%) will go towards the protocol rather than liquidity providers when turned on. Current swap fees are between 0.01% to 1% for V3.

In our view, **while UNI holders seem to benefit directly from the monetization of the protocol, the cascading effects of turning on the fee switch is less straightforward than it seems.** Referencing traditional start-up models, network-based businesses tend to grow their network as much as possible in the initial stages (even at the expense of operating at a loss) to a point when switching costs for users become too high before they start monetizing the platform. In the case of Uniswap, the reduction in rewards for LPs could result in a slowdown in growth of the protocol. In the worst-case scenario, a reduction in yield disincentivizes LPs to provide liquidity which could result in higher slippage. Higher execution costs could in turn lead to lower trading volume as traders move to other DEXes, resulting in lower overall protocol revenue. **The end result might be a lose-lose situation for both liquidity providers and UNI holders.**

To put some numbers to this discussion, Uniswap's annualized fees are approximately US\$544M at the time of writing.⁵ Assuming protocol swap fees are turned on and set at 10%, this translates to US\$54.4M / year of protocol fees. Based on the current market capitalization of \$6.7B, this implies a mere ~0.8% APR.

That said, turning on the fee switch could be a positive price catalyst for the UNI token and could help bolster the Uniswap DAO's treasury which is largely denominated in native UNI tokens. **An alternative middle ground could be to kick start the fee switch process with**

a small nominal fee. Fees can then be adjusted accordingly depending on the initial feedback. At the time of writing, Uniswap has just passed the “consensus check” phase of its governance process to pilot a fee switch that is proposed to run for 120 days. The pilot proposes for a 10% protocol fee to be applied to selected pools.⁶

Uniswap Financials

Income Statement				
	Q3 2021	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$307,799,592	\$468,263,696	\$311,387,513	\$232,043,228
QoQ Change		52.1%	-33.5%	-25.5%
Less: Fees to LP	-\$307,799,592	-\$468,263,696	-\$311,387,513	-\$232,043,228
Protocol Revenue	\$0	\$0	\$0	\$0
QoQ Change		N.A.	N.A.	N.A.
Protocol Margin	0.0%	0.0%	0.0%	0.0%
Less: Token Emissions	\$0	\$0	\$0	\$0
Net Income	\$0	\$0	\$0	\$0
QoQ Change		N.A.	N.A.	N.A.
Net Income Margin (%)	0.0%	0.0%	0.0%	0.0%

Source: Token Terminal, Binance Research Estimates

Uniswap generated over US\$232M in revenue in Q2 2022, of which all of that went to liquidity providers as it has yet to turn on the fee switch. Depending on the outcome of the fee switch discussion, 10-25% of the revenue could accrue to the protocol. Note that Uniswap does not provide liquidity mining incentives through token emissions currently. Assuming this does not change, Uniswap could become profitable if the fee switch proposal is turned on, ceteris paribus.

PancakeSwap

PancakeSwap is a DEX built on the BNB Smart Chain with an Automated Market Maker (“AMM”) model for swapping BEP-20 tokens. Apart from offering swaps, the platform also has other features such as yield farming, perpetual trading, NFT marketplace, and others.

PancakeSwap is the largest DEX on the BNB Chain by TVL, accounting for over 56% of TVL on the chain. At the time of writing on 12 August 2022, PancakeSwap has over \$3.3B in TVL. In terms of user activity, PancakeSwap had over 2.3M users, and facilitated 26M transactions over the past 30 days.⁷

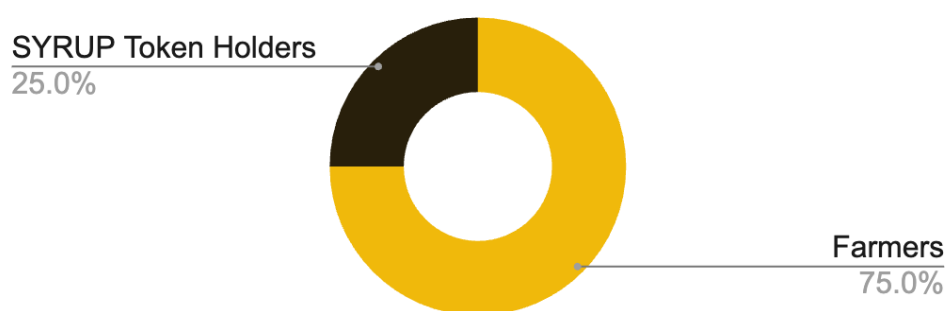
CAKE Tokenomics

The protocol’s native token is CAKE, a BEP-20 token on the BNB Smart Chain. Over the past few months, PancakeSwap has introduced several changes to its tokenomics model. Specifically, in V2 of its tokenomics model, **PancakeSwap passed a proposal to cap the maximum supply of CAKE to 750M. The DEX also improved the utility of the CAKE token by adding additional use cases** for locked CAKE in the form of weighted voting, boosted farm yields, and boosted initial farm offerings (“IFO”) allocation.

CAKE Supply

The initial distribution of the CAKE token included 75% allocation to farmers and 25% to SYRUP token holders.

Figure 6: CAKE’s initial supply was split between farmers and SYRUP token holders



Source: PancakeSwap, Binance Research

CAKE is inflationary - there is an emission rate of 40 CAKE per block, of which approximately 28.85 is burned, resulting in effective emission of roughly 11.16 CAKE per block or around 321.2K CAKE per day.⁸ The end goal is to make CAKE emission-neutral or deflationary. Assuming no changes to the current emission rate, there will be an

approximate runway of 3 years before the maximum 750M CAKE supply is reached. There are also other deflationary measures to keep inflation in check by burning CAKE.

Figure 7: CAKE Emissions Table

	Emission/block (CAKE)	Emission/day (CAKE)
Emission	40	1,152,000
Burned Weekly	~28.85	~830,800
Effective Emission	~11.16	~321,200

Source: PancakeSwap

CAKE Utility

- ❖ **Governance:** CAKE represents the governance token for PancakeSwap, allowing users to vote on proposals.
- ❖ **Staking Yield:** Holders earn trading fees by providing liquidity using CAKE, or can stake CAKE to earn other types of tokens.
- ❖ **Locked CAKE Derivatives:** Locked CAKE derivatives provide additional benefits such as boosted IFO benefits (iCAKE), boosted voting power (vCAKE), and boosted farm yields (bCAKE).

Locked CAKE derivatives benefit users who lock their CAKE in the fixed-term CAKE staking pool. iCAKE determines the maximum CAKE a user can commit in the PancakeSwap IFO public sales. The number of iCAKE a user has is calculated based on the number of CAKE staked in the fixed-term CAKE staking pool and the total staking duration. vCAKE represents boosted voting power based on a user's fixed-term CAKE staking position. Generally, the longer the remaining duration of the staking position, the higher the vCAKE a user has. Finally, bCAKE represents boosted farm rewards. It is a boost multiplier that allows users to boost their CAKE yield up to two times from selected farms.

View on Tokenomics

The PancakeSwap team has proposed several revisions to CAKE's tokenomics over the last few months in V2 of its tokenomics model. This includes a cap on the maximum supply of CAKE, as well as the introduction of locked CAKE derivatives.

In our view, **these revisions have a positive impact on both the supply and demand of the CAKE token, and contribute to a better tokenomics model for CAKE.** Firstly, the introduction of a maximum CAKE token supply removes the possibility of unlimited token emissions that would contribute to significant dilution and inflation. The capped supply also

helps investors make better investment decisions by giving a sense of the fully diluted value of CAKE. Secondly, the locked CAKE derivatives and the corresponding benefits that come with it increases the utility of the CAKE token. Similar to the vote-escrowed CRV (“veCRV”) model of Curve Finance (elaborated in a later section), locking removes some selling pressure of the CAKE token, and contributes to a lower circulating supply of the token. Finally, rewarding holders who lock their CAKE for a longer period of time also aligns the interests of token holders with that of the protocol.

PancakeSwap Financials

Income Statement				
	Q3 2021	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$159,107,001	\$288,362,778	\$135,275,029	\$109,231,011
QoQ Change		81.2%	-53.1%	-19.3%
Less: Fees to LP	-\$108,192,761	-\$196,086,689	-\$91,987,020	-\$74,277,088
Protocol Revenue	\$50,914,240	\$92,276,089	\$43,288,009	\$34,953,924
QoQ Change		81.2%	-53.1%	-19.3%
Protocol Margin	32.0%	32.0%	32.0%	32.0%
Less: Token Emissions	-\$522,757,800	-\$453,449,600	-\$221,521,500	-\$162,089,200
Net Income	-\$471,843,560	-\$361,173,511	-\$178,233,491	-\$127,135,276
QoQ Change		23.5%	50.7%	28.7%
Net Income Margin (%)	-296.6%	-125.2%	-131.8%	-116.4%

Source: Token Terminal, PancakeSwap, Binance Research Estimates

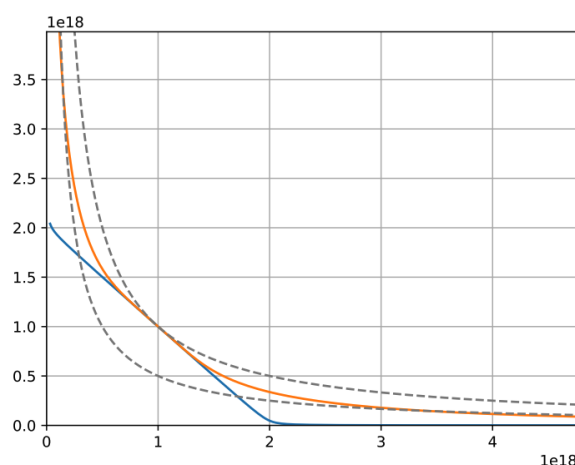
PancakeSwap generated over US\$109M in total revenue in Q2 2022, of which around 68% of that accrues to the LPs. Similar to other DEXes, a large part of expense comes from token emissions which resulted in a net loss of around US\$127M in Q2 2022.

Curve

Curve Finance started out differentiating itself through its focus on offering swaps between stablecoins or similarly priced assets (e.g. ETH/STETH) with low slippage. Given the variety of stablecoins (e.g. USDT, USDC, BUSD etc.) and the numerous use cases for stablecoins, the demand for capital efficient and low slippage stablecoins swaps is high. One of the most utilized pools is Curve's 3CRV pool which consists of DAI, USDC, and USDT. Since its launch, Curve has grown quickly to be one of the leading DEXes by facilitating low-slippage swaps between stablecoins.

Curve launched its V2 update in June 2021 which allows swaps between non-pegged tokens. Curve V2's mechanism holds some similarities to Uniswap V3 in that it also relies on concentrated liquidity. However, unlike Uniswap V3, LPs are unable to choose their liquidity range. Instead, Curve V2 automatically concentrates liquidity around an internal oracle price, which is a moving average of executed trades. The pools also have fees ranging between 0.04% to 0.40% that adjust dynamically depending on the difference between the internal price oracle and the actual price of the assets.

Figure 8: Comparison of AMM invariants - Constant-product (dashed), StableSwap (blue) and Curve V2 (orange)



Source: Curve

The chart above illustrates the curves of a few different AMM invariants. The traditional constant product model (dashed line) results in a distribution of liquidity across the entire curve from '0' to ' ∞ '. To improve capital efficiency and to allow lower slippage of similarly-priced assets (e.g. stablecoins), Curve V1's StableSwap invariant design (blue line) concentrates liquidity near '1'. Curve V2 (orange line) has a curve that is largely similar to the StableSwap curve for small price movements, but displays asymptotic behavior when there are large fluctuations in prices of non-pegged assets.

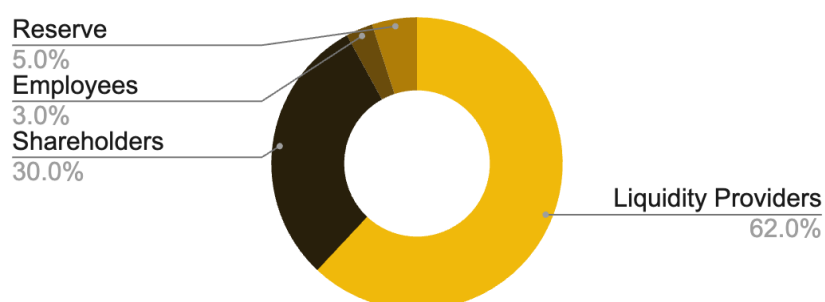
CRV Tokenomics

CRV is CurveDAO's native governance token which gives token holders the ability to vote on governance proposals for the protocol. Curve introduced a vote locking mechanism that was also adopted by other protocols. With this mechanism, **users are incentivized to lock their CRV tokens for up to 4 years in exchange for vote-escrowed CRV ("veCRV") tokens**. Locking is irreversible and the corresponding amount of veCRV received depends on the amount and duration the token is locked. Generally, the longer the locked duration, the more veCRV received. More details on the utility of veCRV are available in the section on "CRV Utility".

CRV Supply

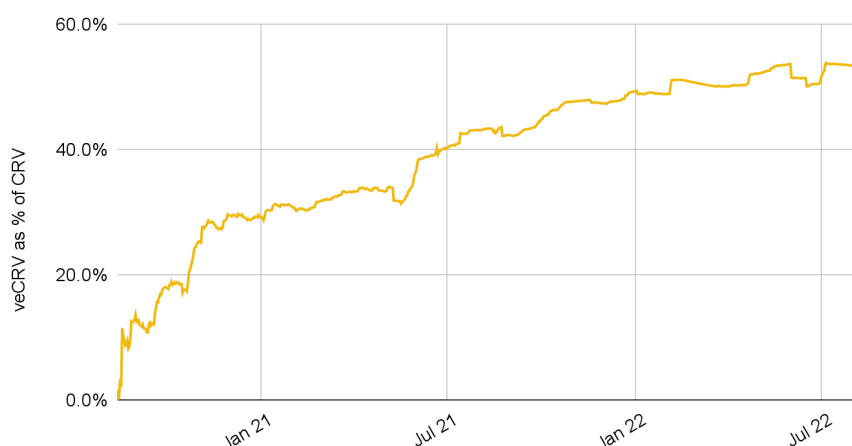
The total supply of 3.03B is distributed with the bulk of allocation to liquidity providers. The remaining is split among shareholders, employees, and the community reserve.

Figure 9: Majority of CRV's total supply is allocated to liquidity providers



Source: Curve, Binance Research

There is currently more than half of CRV tokens being locked as veCRV with an average lock duration of 3.60 years.⁹ While the current inflation rate is high at approximately 12%, the locking mechanism reduces the selling pressure of the token as there is less available CRV supply in the market.¹⁰

Figure 10: veCRV as % of total CRV has been increasing steadily

Source: Dune Analytics (@mrblock_buidl), Binance Research

CRV Utility

For each trade that is executed on Curve, liquidity providers to the pool earn a percentage of fees in the form of CRV tokens. While this incentive model is not new to DEXes, what makes Curve's tokenomics stand out is its veCRV model. **CRV by itself has limited utility, but use cases expand significantly when the CRV tokens are locked and exchanged for veCRV.** In general, utility has two broad components - governance, and rewards.

- ❖ **Governance:** veCRV holders can vote on DAO proposals and can vote for gauge weights which are used to determine how much CRV rewards each pool gets.
- ❖ **Staking Rewards:** 50% of all trading fees are distributed to veCRV holders.
- ❖ **Boosting Rewards:** veCRV allows token holders to boost rewards of up to 2.5x on their provided liquidity.

Figure 11: veCRV offers additional utility over CRV

	Liq in pool No veCRV	Liq in pool Has veCRV	Liq in pool & gauge No veCRV	Liq in pool & gauge Has veCRV	No liq No veCRV	No liq Has veCRV
Earns lending & trading fees	Yes	Yes	Yes	Yes	No	No
Earns CRV	No	No	Yes	Yes	No	No
Earns more CRV (boost)	No	No	No	Yes	No	No
Can vote on DAO proposals	No	Yes	No	Yes	No	Yes
Can vote on gauge weights	No	Yes	No	Yes	No	Yes
Earns gov fees	No	Yes	No	Yes	No	Yes

Source: Curve Finance

In summary, CRV holders have monetary incentives to lock CRV as it increases how much they earn from providing liquidity, and also gives passive income from all Curve pools in the form of trading fees.

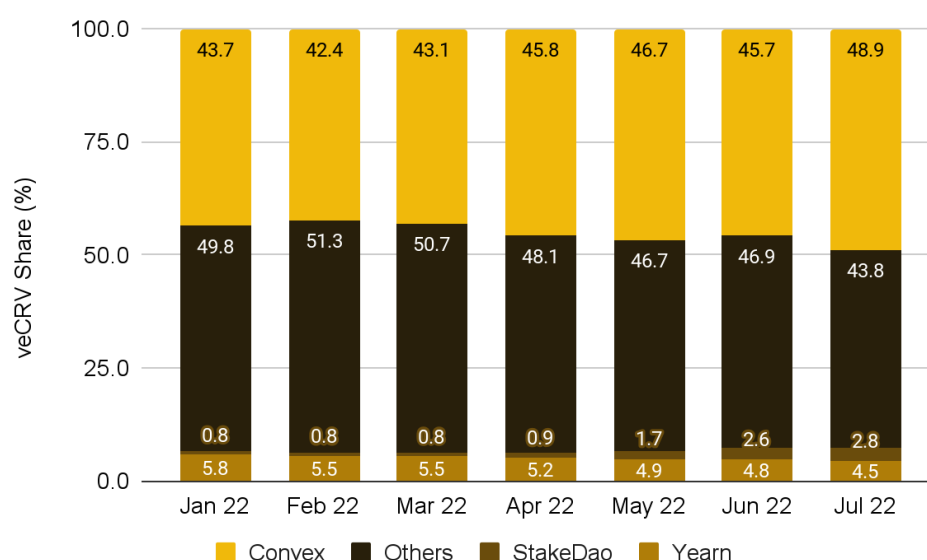
View on Tokenomics and the Curve Wars

The discussion on Curve tokenomics is not complete without mentioning the Curve Wars. The Curve Wars is effectively a fight for liquidity capture in which projects compete to acquire as much CRV as possible to increase its influence and strengthen their position in the ecosystem.

Generally, higher liquidity of a project's token is preferred as it minimizes slippage and encourages trading. For a project with their tokens listed on Curve, the advantage of holding veCRV includes being able to incentivize liquidity of their own tokens by directing their votes to dictate where the CRV inflation should go. In other words, projects can vote for their own pools to boost the pool's APY such that LPs are incentivized to provide liquidity to that pool. The more veCRV a project holds, the larger the influence they have over the gauge weights which determine the amount of CRV rewards allocated to each pool.

Given the direct impact of veCRV on liquidity of Curve pools, the competition by projects to acquire and stockpile veCRV is what has been termed as the Curve Wars. **Losing the war leads to a fall in yield for the project's liquidity pool, and capital may move elsewhere in search of higher yield.**

Figure 12: Convex has the highest share of veCRV



Source: Dune Analytics (@banteg), Binance Research

At present, Convex Finance has emerged as the leader in the Curve Wars, holding approximately 48% of circulating veCRV. This means that Convex Finance has the most voting power in Curve's governance and has the most influence to direct CRV rewards on

Curve pools. Convex Finance has been able to capture a large share of veCRV by allowing LPs to earn boosted yields without needing to lock up excess capital in veCRV. Short of diving into details, there is a related but disparate “Convex War” that has ensued among protocols vying for Convex’s governance token to influence how Convex should put its veCRV to use.

Overall, the veTokenomics model of Curve is interesting and has inspired a few other protocols to adopt a similar model. Despite the high inflation of CRV, Curve has discovered a way to offset the selling pressure of its native CRV tokens by introducing a locking mechanism for the tokens. At the same time, it has exhibited the beauty and promise of DeFi in terms of composability as projects such as Convex build on top of Curve to streamline and simplify the vote escrow process.

Curve Financials

Income Statement				
	Q3 2021	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$12,551,552	\$39,467,238	\$36,905,166	\$24,145,726
QoQ Change		214.4%	-6.5%	-34.6%
Less: Fees to LP	-\$6,275,776	-\$19,733,619	-\$18,452,583	-\$12,072,863
Protocol Revenue	\$6,275,776	\$19,733,619	\$18,452,583	\$12,072,863
QoQ Change		214.4%	-6.5%	-34.6%
Protocol Margin	50.0%	50.0%	50.0%	50.0%
Less: Token Emissions	-\$125,438,769	-\$219,593,608	-\$173,223,421	-\$90,454,788
Net Income	-\$119,162,993	-\$199,859,989	-\$154,770,838	-\$78,381,926
QoQ Change		-67.7%	22.6%	49.4%
Net Income Margin (%)	-949.4%	-506.4%	-419.4%	-324.6%

Source: Token Terminal, Curve, Binance Research Estimates

Curve generated over US\$24M in total revenue in Q2 2022. Around US\$12M or 50% of the fees were paid to liquidity providers. After accounting for token emissions, the protocol had a net loss of around US\$78M in Q2 2022.

Balancer

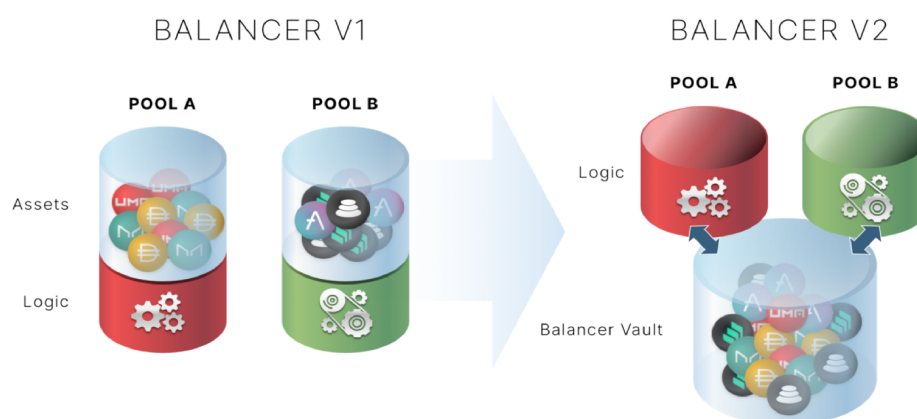
Balancer is a DEX that allows users to swap tokens and for LPs to earn rewards by providing liquidity. Unlike traditional liquidity pool models where two assets have a 50/50 allocation, Balancer enables the creation of liquidity pools with up to eight different assets in any ratio. Balancer pools can be thought of as decentralized index funds which automatically rebalance tokens' allocations when the ratio diverges from the fixed parameters.

Balancer offers two broad types of pools:

- ❖ **Public pools:** These allow anyone to contribute liquidity. Pool creators can customize the parameters (e.g. token ratios, trading fees etc.) before launching the pools but cannot alter them thereafter.
- ❖ **Private pools:** These enable creators to fully customize the pool, and only the creator can add or withdraw an asset from the pool. The creator can also adjust the parameters of the pool, including weightings, assets, and fees.

A key feature of Balancer is its ability to optimize for the best possible swap price across the multiple liquidity pools on its platform. Given that Balancer has numerous liquidity pools with different tokens and allocations, some liquidity pools have better prices than others. Instead of traders manually going through each pool to find the best price, Balancer employs a Smart Order Routing ("SOR V2") system to source the trade from multiple pools and execute the swap in a gas-efficient manner. To facilitate this, Balancer stores all tokens in a centralized smart contract called the "Vault".¹¹ As such, **instead of having to transfer ERC-20 tokens out of multiple pools to optimize for the best price and incur gas at each stage, only a single interaction with the Vault is required.** Such a system is especially beneficial for traders with large or complicated orders involving multiple asset swaps.

Figure 13: Balancer's vault stores all pool assets in one centralized place



Source: Balancer

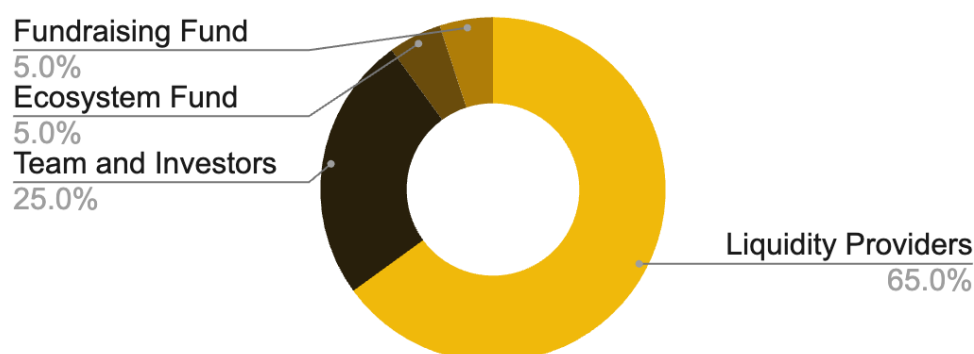
BAL Tokenomics

Balancer passed the veBAL governance proposal and launched the vote-escrow system in March 2022.¹² The veBAL system largely emulates the veCRV model discussed previously with a few differences. One major difference to Curve is that **instead of locking BAL, Balancer Pool Tokens (“BPTs”) that are received when liquidity is provided to the 80/20 BAL/wETH pool are locked instead.** Secondly, the longest duration users can lock BPTs is one year, as compared to Curve’s maximum 4 years duration. This allows for a shorter waiting period to transition in the event governance decides to use a new voting system.

BAL Supply

Prior to a recent governance proposal, Balancer had a constant 145K BAL per week emission for its token previously. The inflation schedule was unsustainable in the long-term given the unpredictability of the total token supply and the value dilution over time. Along with the launch of veBAL, a new inflation schedule was introduced which halves inflation every 4 years. The final BAL supply will be around 94M BAL (based on Balancer’s public spreadsheet), with the bulk allocated to liquidity providers.¹³

Figure 14: Liquidity providers will receive the bulk of BAL’s token distribution



Source: Balancer, Binance Research

BAL Utility

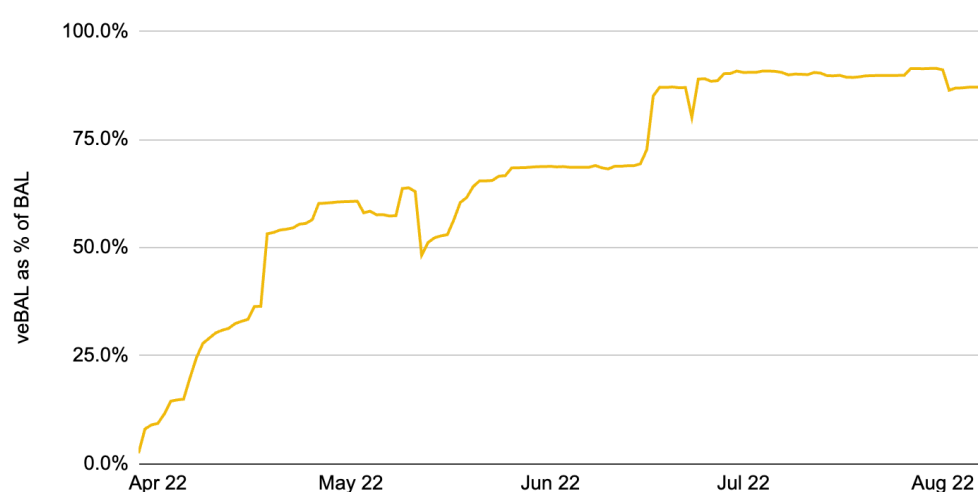
To ensure long-term alignment of interests, BAL token holders must lock their BPTs in exchange for veBAL which has the following utility:

- ❖ **Governance:** veBAL token holders can vote for governance proposals. Holders can also vote on gauges to determine how liquidity mining incentives should be allocated.
- ❖ **Boosting Rewards:** Depending on the duration of the locking period, veBAL holders can earn boosted liquidity mining rewards of up to 2.5x.
- ❖ **Protocol Revenue:** Protocol fee is 50% of the platform’s swap fees, of which 75% of the protocol fee will be distributed back to veBAL holders.

View on Tokenomics and the Balancer Wars

As BAL offers no direct utility for holders, BAL token holders are compelled to consider providing liquidity to the 80/20 BAL/wETH pool to receive BPTs and lock them in exchange for veBAL. Since the launch of veBAL in end-March 2022, the number of BPTs in the 80/20 BAL/wETH pool has increased from 2.9M to 8.1M as of 11 August 2022. The percentage of BPTs locked as veBAL has increased steadily since launch and is currently at over 87%, with an average lock duration of 11.67 months.¹⁴

Figure 15: Percentage of veBAL Locked



Source: Dune Analytics (@balancerlabs), Binance Research

Given the vote-escrow mechanism with a corresponding lock period, it is not surprising that there would be demand for a liquid wrapper for veBAL. Similar to how Convex offers a liquid alternative for veCRV, there has been an emergence of protocols like Aura Finance that does the same by building on top of Balancer.

Aura Finance is currently the protocol with the largest veBAL share at 28%.¹⁵ Considering that it launched nearly one month ago in mid-June, the growth has been rapid and impressive. It allows users to lock their BPT tokens on Aura Finance in exchange for a tokenized liquid wrapper of veBAL called auraBAL. In the background, Aura will lock the BPT tokens for the maximum 1-year duration on Balancer.

Similar to the Curve Wars, the environment looks like a perfect set-up for protocols to compete for influence over Balancer. That said, given the comparatively shorter locking period of 1 year vs. 4 years for Curve, and also a much smaller TVL for Balancer, the extent of competition will likely be lower than Curve. It would be interesting to monitor how the situation plays out over the next few months in this relatively quiet market environment.

Balancer Financials

Income Statement				
	Q3 2021	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$19,873,133	\$35,321,742	\$12,485,870	\$14,732,765
QoQ Change		77.7%	-64.7%	18.0%
Less: Fees to LP	-\$19,873,133	-\$35,321,742	-\$11,237,283	-\$7,366,383
Protocol Revenue	\$0	\$0	\$1,248,587	\$7,366,383
QoQ Change		N.A.	N.A.	490.0%
Protocol Margin	0.0%	0.0%	10.0%	50.0%
Less: Token Emissions	-\$45,183,450	-\$39,396,500	-\$25,937,600	-\$19,415,500
Net Income	-\$45,183,450	-\$39,396,500	-\$24,689,013	-\$12,049,118
QoQ Change		12.8%	37.3%	51.2%
Net Income Margin (%)	-227.4%	-111.5%	-197.7%	-81.8%

Source: Token Terminal, Balancer, Binance Research Estimates

Balancer collected over US\$14M in revenue in Q2 2022, of which half of this goes to the protocol. On a quarter-on-quarter basis, Balancer's protocol revenue rose in Q2 2022 as it increased protocol fees from 10% to 50% in end-March 2022. After taking into account token emissions, Balancer had a net loss of approximately US\$12M in Q2 2022.

Trader Joe

Trader Joe launched in July 2021 and ascended to be the top DEX on the Avalanche network within a span of 2 months, overtaking the prior market leader Pangolin. Pangolin was the first DEX on Avalanche but activity on the network was relatively low. Trader Joe offered a strong DEX alternative for Avalanche traders and successfully siphoned liquidity away from Pangolin through a combination of marketing efforts and introduction of new features. The platform provided high yields on AVAX-native pools, and had an attractive user interface that appealed to the masses.

Today, besides trading, users can also use Trader Joe for staking, lending, borrowing, trading NFTs, and participating in protocol launches.

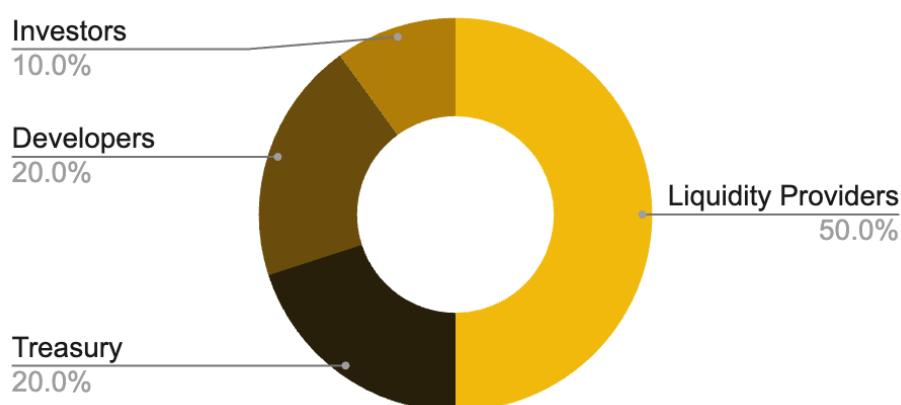
JOE Tokenomics

Trader Joe's native token is JOE. The DEX introduced a new tokenomics model in February 2022 in a bid to increase utility and alleviate the selling pressure of JOE (more details under "JOE Utility" section).

JOE Supply

JOE has a maximum supply of 500M JOE. The tokens will be emitted over 30 months, ending in Jan 2024 with the bulk allocated to liquidity providers, and the remaining split among the treasury, developers, and future investors.¹⁶

Figure 16: JOE's supply will largely be allocated to liquidity providers



Source: Trader Joe, Binance Research

JOE Utility

Trader Joe revamped its tokenomics and introduced a modular staking model for its JOE tokens in Feb 2022.¹⁷

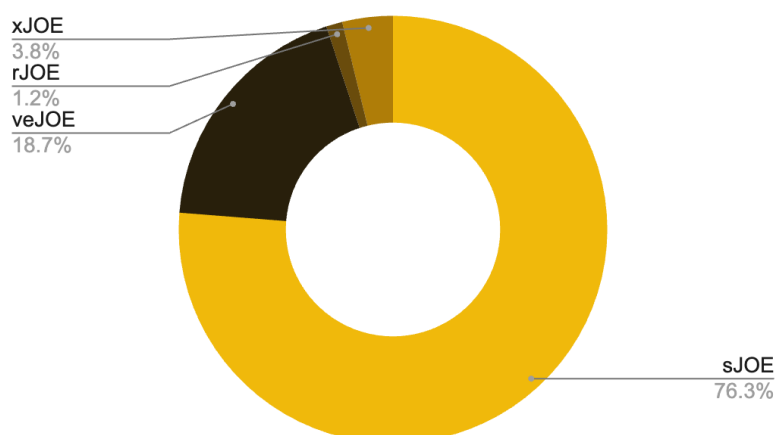
Previously, users would stake JOE for xJOE, which allows holders to receive a share of the protocol's fees in the form of JOE. For every swap on the platform, a 0.05% fee is collected and used to buy back JOE tokens. Upon unstaking, users will receive the originally deposited JOE and additional JOE from fee rewards. This is similar to SushiSwap's xSushi model as a gas-efficient manner of compounding fee rewards. Beyond that, there are few other incentives for holding JOE. Given the high inflation of the token, holders would sell JOE periodically, creating selling pressure on the token.

As part of the tokenomics revamp, Trader Joe increased the number of use cases of JOE and introduced modularity to the token. This involves breaking down the token into different components, each with its own utility and yield. Specifically, in the new model, instead of staking JOE for xJOE, the new staking mechanism consists of 3 staking options for JOE that users can choose between, or in any combination of the following:

- ❖ **sJOE:** Earn platform revenue in the form of stablecoin rewards.
- ❖ **rJOE:** Gain access to Rocket Joe launches.
- ❖ **veJOE:** Boost farming yields in select farms of up to 2.5x. veJOE holders are also entitled to governance voting. veJOE is non-transferable and accrues over time by keeping JOE staked.

View on Tokenomics

Essentially, the modular staking system splits up the JOE token's utility into protocol fee rewards, boosted yields and launchpad access rather than combining all features in one staking token. **The modularity of the token allows more flexibility for users to determine what utility they value more and stake their JOE token accordingly.** Currently, most of the JOE tokens are being staked in sJOE to earn platform revenue in the form of stablecoin rewards.¹⁸

Figure 17: Most of the JOE staked today are in sJOE

Source: Trader Joe, Binance Research

sJOE offers utility similar to that of xJOE in the form of platform revenue sharing. One key difference is that the rewards are paid out in the form of stablecoin rewards for sJOE, as compared to xJOE which paid out rewards in terms of JOE tokens. This offers users the flexibility of either redeploying the stablecoin back into the JOE ecosystem, or to deploy it elsewhere. The benefit to the protocol is a reduction in JOE selling pressure in the secondary market as users who do not want overexposure to JOE no longer have to sell the additional JOE they receive from staking as the default is to receive rewards in terms of stablecoins.

rJOE tokens serve as a gateway to launch events on Trader Joe's launchpad called Rocket Joe. Users will deposit rJOE to enter a launch. The more rJOE tokens deposited, the higher the AVAX allocation (100 rJOE to 1 AVAX allocation). rJOE will be burnt for AVAX allocation credit. Theoretically, as the AVAX ecosystem grows alongside new AVAX projects, there should be more launches on Rocket Joe and rJOE holders can benefit from participation through Rocket Joe. This should also raise demand for the JOE token. However, launch activity has been rather dismal with only seven launches since the start of Rocket Pool in February 2022.¹⁹ **The lack of deal flow is likely to weigh on demand for rJOE.**

The veJOE model has utilities similar to that of veCRV and veBAL in the form of governance powers and boosted rewards. veJOE is also non-transferrable. However, instead of having a locking period, veJOE holders can unstake their veJOE tokens at any time. The caveat is that they would lose all the veJOE accrued and have to start earning boost from zero. This ensures alignment of long-term interest of token holders and the protocol as token holders have added incentive to stake their JOE tokens for a longer period of time. As time goes by, the increase in accrued veJOE will further reduce the incentive for unstaking as the opportunity cost of unstaking increases. Similar to the Curve Wars, it is not surprising that a

"JOE War" where protocols compete for JOE tokens has emerged. Given the importance of Trader Joe in the Avalanche ecosystem, it is understandable that projects will want to have control over the voting gauges once they are enabled, giving them power over liquidity of the ecosystem. The largest holder of veJOE is Vector Finance which controls over 55% of all veJOE.²⁰

Trader Joe Financials

Income Statement			
	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$102,881,462	\$58,153,194	\$24,703,205
QoQ Change		-43.5%	-57.5%
Less: Fees to LP	-\$85,734,552	-\$48,460,995	-\$20,586,004
Protocol Revenue	\$17,146,910	\$9,692,199	\$4,117,201
QoQ Change		-43.5%	-57.5%
Protocol Margin	16.7%	16.7%	16.7%
Less: Token Emissions	-\$116,405,856	-\$39,988,080	-\$17,886,960
Net Income	-\$99,258,946	-\$30,295,881	-\$13,769,759
QoQ Change		69.5%	54.5%
Net Income Margin (%)	-96.5%	-52.1%	-55.7%

Source: Token Terminal, Trader Joe, Binance Research Estimates

Trader Joe generated over US\$24M in total revenue in Q2 2022, of which approximately 83% was distributed to LPs. As a result, the platform recorded a protocol revenue of US\$4.1M for the quarter. After accounting for token emissions, Trader Joe had a net loss of approximately US\$ 13.8M.

Serum

Serum is one of the leading DEX on Solana with an on-chain central limit order book (“CLOB”) system to facilitate trades. It is the product of the Serum foundation, which was created by FTX and Alameda Research. The order book system allows users to submit orders with limit prices and specific sizes, as opposed to the typical AMM model.

More than just a DEX itself, Serum can be thought of as a matching and liquidity infrastructure layer of Solana that aims to power an entire ecosystem of DeFi services through composability. Serum DEX is able to achieve this through its open-source structure that allows projects to tap onto Serum’s CLOB and access shared liquidity. As a result, Serum is able to match orders from one dApp with orders from a completely different dApp that is powered by Serum. To a user, one might not even be aware that their orders have interacted with Serum DEX as they could be using a different dApp with a different front-end interface.

The composability of Serum also means that a myriad of financial applications can be built on top of Serum. DEXes such as Raydium and Mango Markets have their own user interface and additional features (e.g. cross-chain, differences in tokens) but are each powered by Serum’s CLOB. **In effect, Serum’s shared liquidity allows it to function as a hub for liquidity with a strong network effect (the more dApps built on Serum, the stronger its value proposition) and position it as the liquidity infrastructure layer of Solana.**

Figure 18: Serum powers many dApps across different verticals



Source: Serum

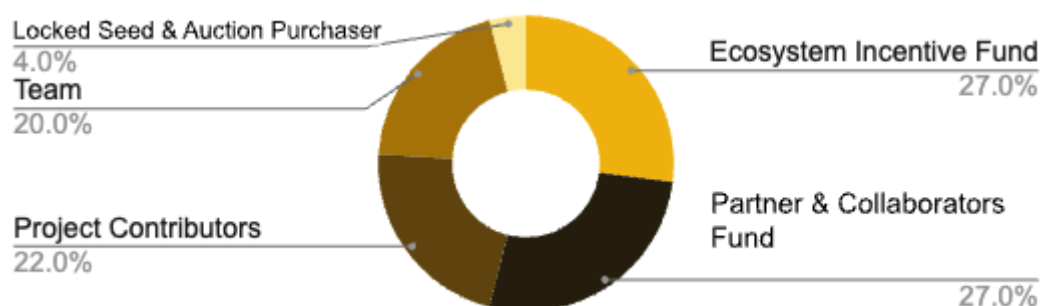
SRM Tokenomics

SRM is the governance token of Serum and is native to Solana. It is also available on the Ethereum blockchain as an ERC-20 token. MegaSerum (“MSRM”) is created by locking up 1 million SRM. Conversely, 1 MSRM can also be redeemed for 1 million SRM.²¹ Token holders benefit from holding SRM and generally receive enhanced benefits for holding MSRM (compared to holding the equivalent amount of unlocked SRM).

SRM Supply

SRM has a maximum supply of 10 billion SRM. 10% of supply was unlocked initially, with the remaining 90% that will unlock linearly over 6 years starting from 11 August 2021. SRM is distributed across ecosystem-related funds, project contributors, team, and investors.

Figure 19: SRM is distributed across a variety of groups



Source: Serum, Binance Research

SRM Utility

- ❖ **Governance:** SRM token holders can vote on governance proposals such as making changes to fees.
- ❖ **Fee Discounts:** SRM token holders are eligible for reduced fees (up to 60% off depending on the amount of SRM held) on dApps that are powered by Serum.
- ❖ **Buy and Hold:** 80% of protocol fee revenue goes to a buyback and hold mechanism for SRM.

View on Tokenomics

On initial assessment, the 24% supply allocation to insiders (20% team and advisors + 4% locked seed and auction purchaser) looks reasonable. However, there is minimal transparency with regard to the remaining 76% in terms of how much SRM has been distributed and to whom.

Furthermore, a potentially concerning statistic is the low proportion of SRM circulating supply. Specifically, while SRM has a maximum supply of 10B SRM, and a total supply of approximately 1.1B SRM, only 263M SRM is in circulation. Compared to the maximum supply, only 2.6% of SRM supply is in circulation. **As the remaining SRM supply comes into circulation from future token unlocks, existing token holders will experience dilution of ownership.** A somewhat alleviating factor is an agreement from the original Serum team and some investors to self-enforce further lockups and to reduce sale of SRM tokens beyond the current 7-year schedule.²²

Overall, Serum's product offering is innovative and the protocol has exhibited its ability to build a vibrant ecosystem of dApps by facilitating interoperability and composability. However, investors evaluating the SRM token should take into account the FDV of the token and high inflation associated with token emissions.

Serum Financials

Income Statement				
	Q3 2021	Q4 2021	Q1 2022	Q2 2022
Total Revenue (Total Fees)	\$565,924	\$863,148	\$1,031,558	\$271,508
QoQ Change		52.5%	19.5%	-73.7%
Less: Fees to LP	-\$113,185	-\$172,630	-\$206,312	-\$54,302
Protocol Revenue	\$452,739	\$690,518	\$825,247	\$217,206
QoQ Change		52.5%	19.5%	-73.7%
Protocol Margin	80.0%	80.0%	80.0%	80.0%
Less: Token Emissions	-\$101,730,969	-\$101,230,653	-\$40,623,503	-\$26,393,494
Net Income	-\$101,278,229	-\$100,540,134	-\$39,798,257	-\$26,176,288
QoQ Change		0.7%	60.4%	34.2%
Net Income Margin (%)	-17896.1%	-11648.1%	-3858.1%	-9641.1%

Source: Token Terminal, Serum, Substack (@TAFC)²³, Binance Research Estimates

Serum generated approximately US\$271K in total revenue in Q2 2022, a sharp drop of nearly 74% on a quarter-on-quarter basis. Token emissions form a large part of the protocol's expense, contributing to a net loss of approximately US\$26.2M, and a negative net income margin of approximately -9,600% in Q2 2022.

Financials and Valuation

Each DEX has their own strengths and weaknesses and their operating models vary. A fair evaluation purely from a qualitative standpoint may be difficult as some DEXes may stand out in some ways but lack in others (e.g. business model, tokenomics etc.). As such, to further augment our analysis, we have put together some financial metrics and ratios to serve as common quantitative data points for comparison.

Financial Metrics

The following table provides a high-level summary of a few indicators in terms of token and operating metrics, as well as a snapshot of the revenue and profitability of the DEXes. Numbers used are based on Q2 2022 data.

Figure 20: Summary of DEXes' Metrics (Q2 2022)

Metrics (Q2 2022)						
Token Metrics	Uniswap	Pancake Swap	Curve	Balancer	Trader Joe	Serum
Average Price	\$6.44	\$5.84	\$1.57	\$10.30	\$0.65	\$1.60
Average FDV (US\$B)	\$20.3	\$4.4	\$16.5	\$3.0	\$1.0	\$16.0
Average Market Cap (US\$M)	\$4,699.3	\$1,476.2	\$777.1	\$103.1	\$150.0	\$350.8
Operating Metrics	Uniswap	Pancake Swap	Curve	Balancer	Trader Joe	Serum
Average TVL (US\$M)	\$6,409	\$4,157	\$13,058	\$2,507	\$694	\$438
Trading Volumes (US\$M)	\$166,345	\$43,692	\$37,222	\$10,213	\$8,234	\$679
Average MAU (Based on Unique Addresses)	310,160	7,668,746	13,300	13,674	150,295	212,717
Income Statement Snapshot	Uniswap	Pancake Swap	Curve	Balancer	Trader Joe	Serum
Total Revenue (US\$M)	\$232.0	\$109.2	\$24.1	\$14.7	\$24.7	\$0.3
Protocol Revenue (US\$M)	\$0.0	\$35.0	\$12.1	\$7.4	\$4.1	\$0.2
Net Income (US\$M)	\$0.0	-\$127.1	-\$78.4	-\$12.0	-\$13.8	-\$26.2

Source: Token Terminal, CoinMarketCap, Defi Llama, Binance Research

Relative Valuation

We take the quantitative analysis one step further by examining valuation ratios of the DEXes. This allows a comparison of how the token of each DEX trades relative to others based on specific ratios and gives a sense of how expensive or cheap the tokens are on a relative basis.

Figure 21: Summary of DEXes' Valuation Ratios (Q2 2022)

Financial Ratios (Q2 2022)						
Valuation Ratios	Uniswap	Pancake Swap	Curve	Balancer	Trader Joe	Serum
P/S (FDV / Annualized Total Revenue)	21.9	10.0	170.6	51.1	10.1	14,732.5
P/S (FDV / Annualized Protocol Revenue)	N.A.	31.3	341.2	102.1	60.7	18,415.7
P/E (FDV / Annualized Net Income)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Market Cap / TVL	0.73	0.36	0.06	0.04	0.22	0.80
FDV / TVL	3.17	1.05	1.26	1.20	1.44	36.54
Dividend Yield (Annualized Protocol Revenue / Market Cap)	0.0%	9.5%	6.2%	21.4%	11.0%	0.2%
Other Ratios	Uniswap	Pancake Swap	Curve	Balancer	Trader Joe	Serum
Revenue Per User (Average Monthly Revenue / Average MAU)	\$249.38	\$4.75	\$605.14	\$359.15	\$54.79	\$0.43
Return on TVL (Annualized Net Income / TVL)	0.00%	-12.23%	-2.40%	-1.92%	-7.94%	-23.91%

Source: Token Terminal, CoinMarketCap, Defi Llama, Binance Research

Price-to-Sales ("P/S") Multiple

The P/S multiple is derived from dividing the fully diluted value of the token by the total revenue generated. This metric can be thought of as how much you are paying for each dollar of revenue generated and is a common valuation metric used by investors to consider if the token is "cheap" or "expensive". **Generally, the lower the P/S multiple, the "cheaper" it is.** However, the reality is that this is not a straightforward exercise of simply choosing the token with the lowest multiple as there are usually reasons why investors have

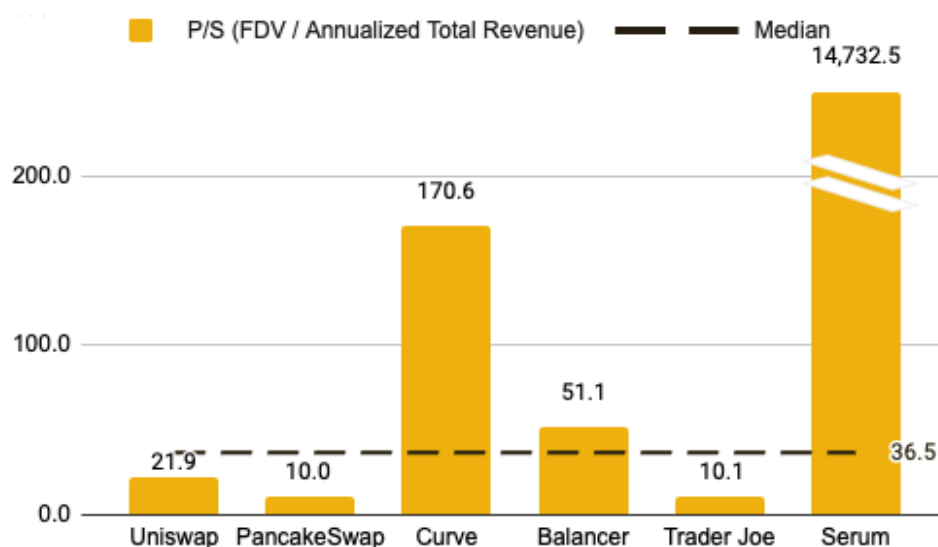
assigned a lower multiple for the token (e.g. poor growth prospects, low profitability etc.). Regardless, the ratios give a general idea of how the market is valuing a project.

We have calculated the P/S multiple in two ways:

- ❖ **FDV / Annualized Total Revenue:** This is based on the total trading fees, including the fees paid to liquidity providers and the fees accrued to the protocol.
- ❖ **FDV / Annualized Protocol Revenue:** This excludes fees paid to liquidity providers and is based on the total fees accrued to the protocol only.

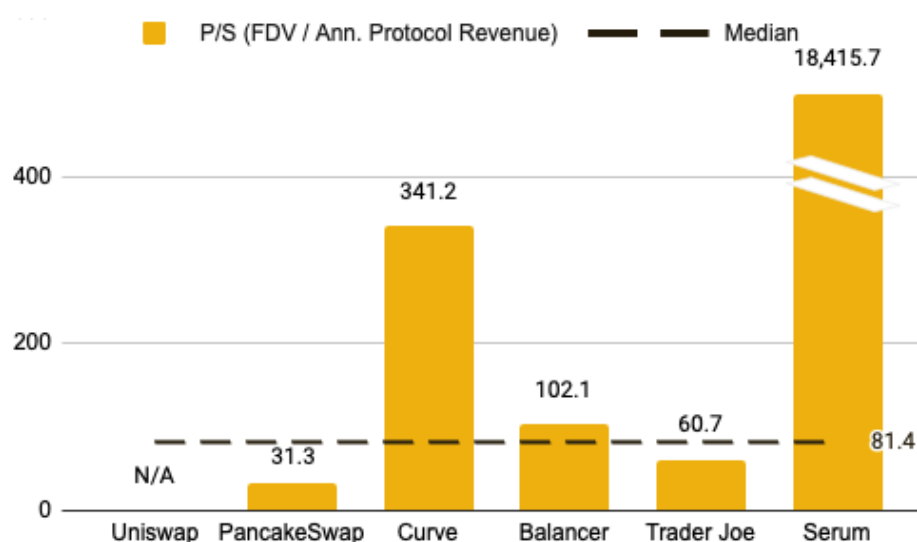
The overall result is largely the same - Serum, Curve, and Balancer trade at a premium compared to the rest of the DEXes. In particular, Serum stands out for its astronomical P/S ratio of 14,733, approximately 400x the median of the sample set. This is contributed by its extremely high FDV of roughly \$16B. To put things into perspective, Serum has roughly the same FDV as Uniswap even though Serum generates only a fraction (~0.1%) of Uniswap's total revenue.

Figure 22: P/S (FDV / Annualized Total Revenue) - CAKE, JOE, and UNI trade at a discount to peers



Source: Binance Research

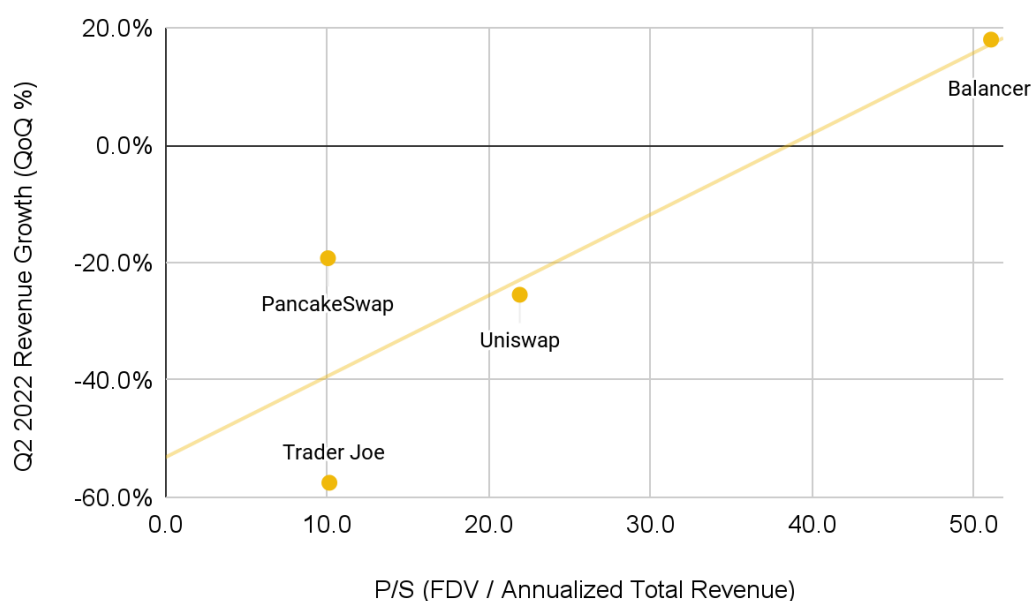
Figure 23: P/S (FDV / Annualized Protocol Revenue) - CAKE and JOE trade at a discount to peers



Source: Binance Research

As alluded to earlier, the P/S ratio itself may be misleading, and it does not present a full picture of why a particular DEX is cheap. In fact, a protocol with a low P/S ratio may be a value trap where it appears like a bargain but is actually fundamentally flawed in some way or another. As such, to provide an additional perspective, we take the P/S analysis a step further by comparing the DEXes' P/S ratios relative to their Q2 2022 revenue growth rate. This is shown in the next chart. Intuitively, a low P/S ratio with a high growth rate is preferred.

DEXes above the line fare better with a lower P/S ratio relative to their growth rate. In particular, **PancakeSwap stands out with a relatively low P/S even though its growth rate is higher than most other DEXes.** Note that Serum and Curve have been excluded from the graph for presentation purposes as they are severe outliers and including them in the chart would distort the scale, making it difficult to interpret the results. Both Serum and Curve fall under the line, implying that they trade at a relatively expensive valuation compared to their growth rate.

Figure 24: P/S to Growth - CAKE and BAL trade at a relatively low valuation*Source: Binance Research*

Price-to-TVL Ratios

Price-to-TVL ratios provide a measure of the token price relative to the TVL in the protocol and give a gauge of how much investors are willing to pay for each dollar of asset deposited in the protocol.

We evaluate two metrics here:

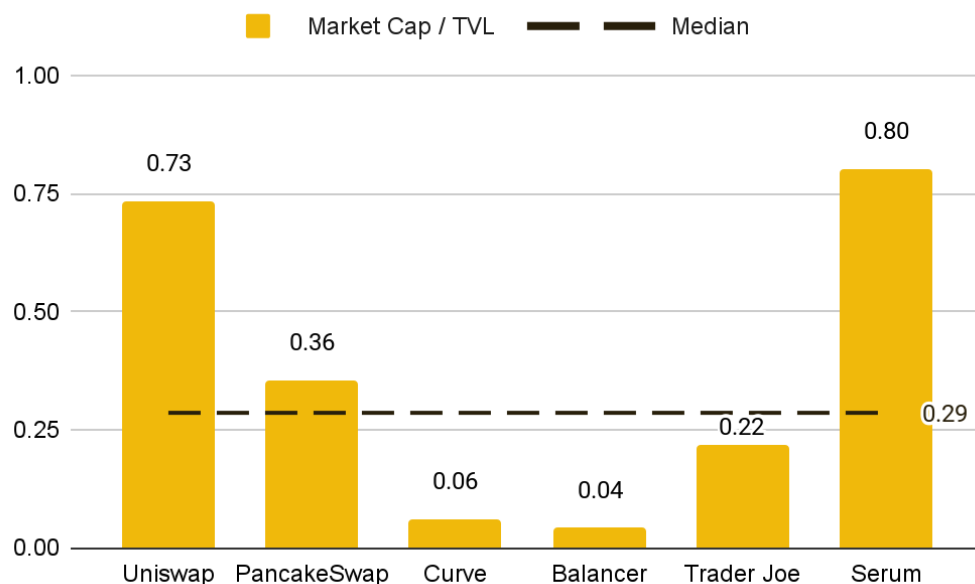
- ❖ **Market Cap / TVL:** This is derived from dividing the circulating market capitalization by the TVL.
- ❖ **FDV / TVL:** This is derived from dividing the fully diluted revenue by the TVL.

Market Cap / TVL is a widely used metric given ease of understanding and widespread availability. However, the FDV / TVL ratio may be a fairer metric for comparison across protocols as it takes into account the maximum total supply of each protocol's tokens. A protocol may have a low market cap / TVL ratio but have a high FDV / TVL due to a small circulating supply of its tokens. Nonetheless, we present both metrics in this section for completeness.

Generally, a lower price-to-TVL ratio is preferred. However, note that these ratios do not factor in the capital efficiency of the protocol in terms of how effective it is at extracting value per dollar of TVL locked. For example, a protocol can command a large TVL but this does not necessarily translate into higher revenue for a variety of reasons (e.g. low trading fees, low trading volume etc.).

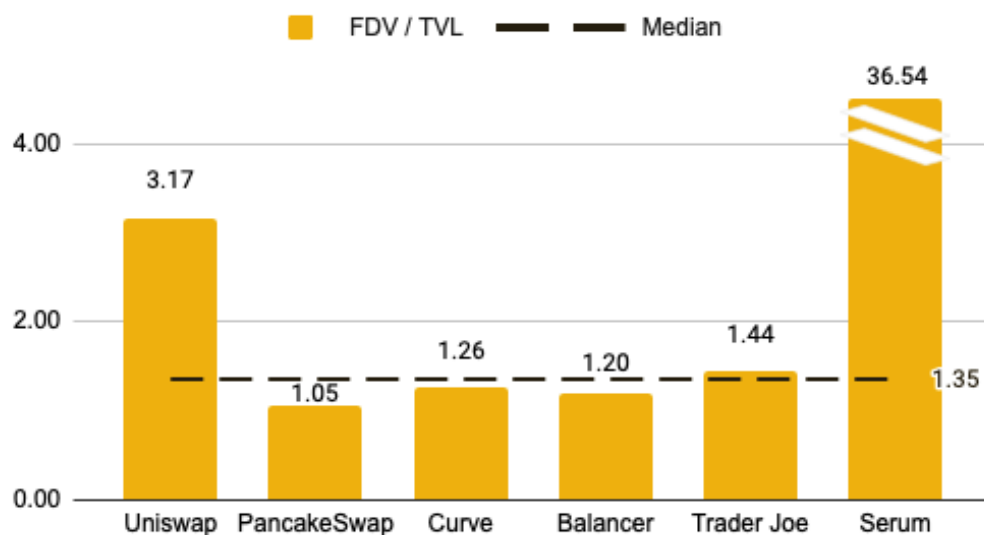
Overall, based on FDV / TVL, PancakeSwap, Balancer, and Curve trade at a discount to the median of the sample set. PancakeSwap has one of the highest TVL across the DEXes, thereby contributing to a low FDV / TVL.

Figure 25: Market Cap / TVL - BAL, CRV, and JOE trade below the median



Source: Binance Research

Figure 26: FDV / TVL - CAKE, BAL, and CRV trade below the median



Source: Binance Research

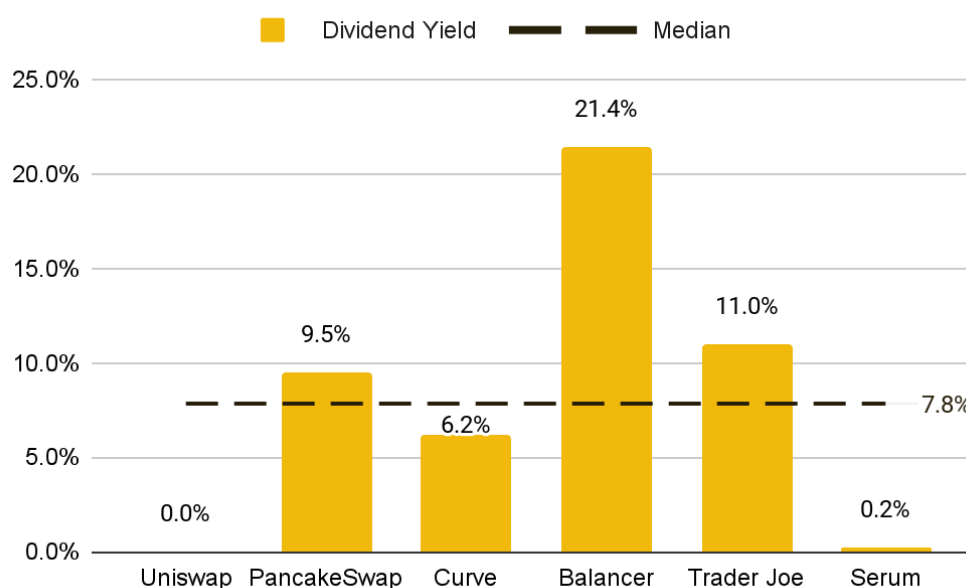
Dividend Yield

Dividend yield represents the cash flow generated by the DEX that is attributable to token holders. It is computed by dividing the annualized protocol revenue to token holders by the market capitalization.

Generally, a higher yield is preferred as it represents higher returns back to token holders. However, given that dividend yields are inversely related to token price, a rise in yield may not necessarily be a good sign if it is driven by a fall in token price.

In this aspect, **Balancer, Trader Joe, and PancakeSwap have dividend yields higher than the median.** Specifically for Balancer, this is contributed by an increase in the protocol swap fees from 10% to 50% in March 2022. This resulted in Balancer having the highest protocol margin across the DEXes in this sample.

Figure 27: Dividend yield - BAL, JOE, and CAKE have higher than median yield



Source: Binance Research

Other Ratios

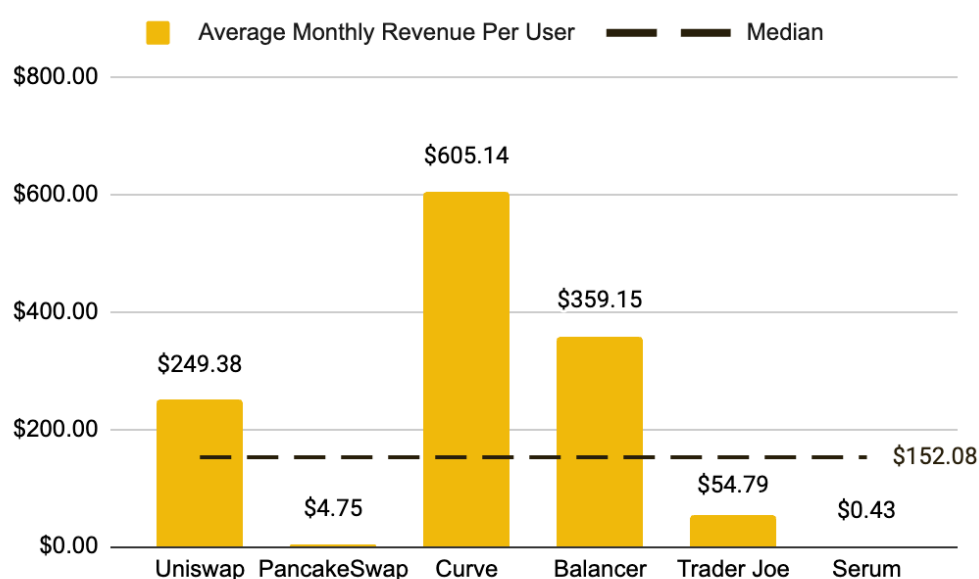
Average Revenue per User (“ARPU”)

ARPU is commonly used to examine a company’s revenue generation capabilities for each user on the platform. Specifically, it is calculated by dividing the amount of revenue generated by the number of active users in a specific period. ARPU is able to provide insights with regard to the type of users of the platform and can be used to calculate how many new users need to be acquired to achieve a specific revenue target.

Examining ARPU data across the DEXes reveals an interesting insight - **there is a large disparity between DEXes that facilitate swaps predominantly on Ethereum and DEXes that predominantly facilitate swaps on other layer 1s (“L1s”)**. Specifically, Uniswap, Curve, and Balancer stand out with ARPU in the hundreds of dollars, as compared to Trader Joe, PancakeSwap, and Serum which have ARPUs in the realms of a few dollars (or as low as \$0.43 on Serum). **That said, this does not mean that the DEXes with lower ARPUs are underperforming.**

Rather, the disparity is likely attributed to the differences in structural ecosystem traits such as differences in trade sizes and the type of users. Swaps conducted on the Ethereum network tend to be associated with higher network fees due to the higher gas cost on Ethereum. As such, it generally makes more economic sense to execute trade sizes beyond a certain threshold minimum on Ethereum, considering the relatively higher gas fees. On the other hand, users that are intending to execute trades with lower quantum will generally turn towards DEXes on other L1s where fees are lower. The end result is that **DEXes that facilitate trades mostly on Ethereum (Uniswap, Balancer, Curve) have generally higher ARPUs due to the larger trade sizes executed by each user.** Correspondingly, more fees are collected per user. **DEXes on the other L1s generally cater to retail users with smaller trade sizes. While they have lower ARPUs, these platforms tend to attract significantly more users.** For example, PancakeSwap had 7.6M monthly active users (“MAU”) in Q2 2022 as compared to Uniswap which had less than 5% of that number with 310K MAU.²⁴ Note that we use the number of unique active addresses as a proxy for number of active users.

Figure 28: Average Revenue per User - CRV, BAL, and UNI have above average ARPU



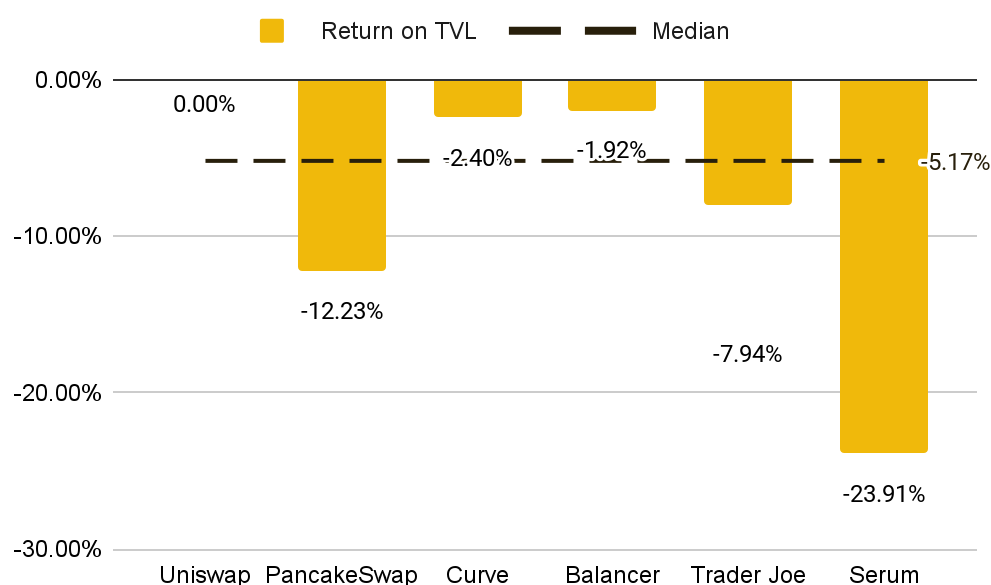
Source: Binance Research

Return on TVL

The Return on TVL ratio is used as a proxy to measure a DEX's profitability per dollar of assets locked on the protocol. This **gives a sense of how efficiently the DEX is able to utilize its deposited assets**. It is derived from dividing the annualized net income by the total value locked on the DEX.

In order of increasing Return on TVL: Serum, PancakeSwap, Trader Joe, Curve, Balancer, Uniswap. A general observation is that the Return on TVL ratio is negative across all the DEXes (except Uniswap). The negative Return on TVL is primarily attributed to token emissions from each DEX to incentivize LPs to contribute liquidity to the liquidity pools. As a result, the DEXes are paying out more money than they are making. Nonetheless, the token emissions are critical to bootstrap the growth and sustainability of the DEXes as they provide additional compensation to liquidity providers beyond trading fees.

Figure 29: Return on TVL - UNI, BAL, and CRV have higher return than average



Source: Binance Research

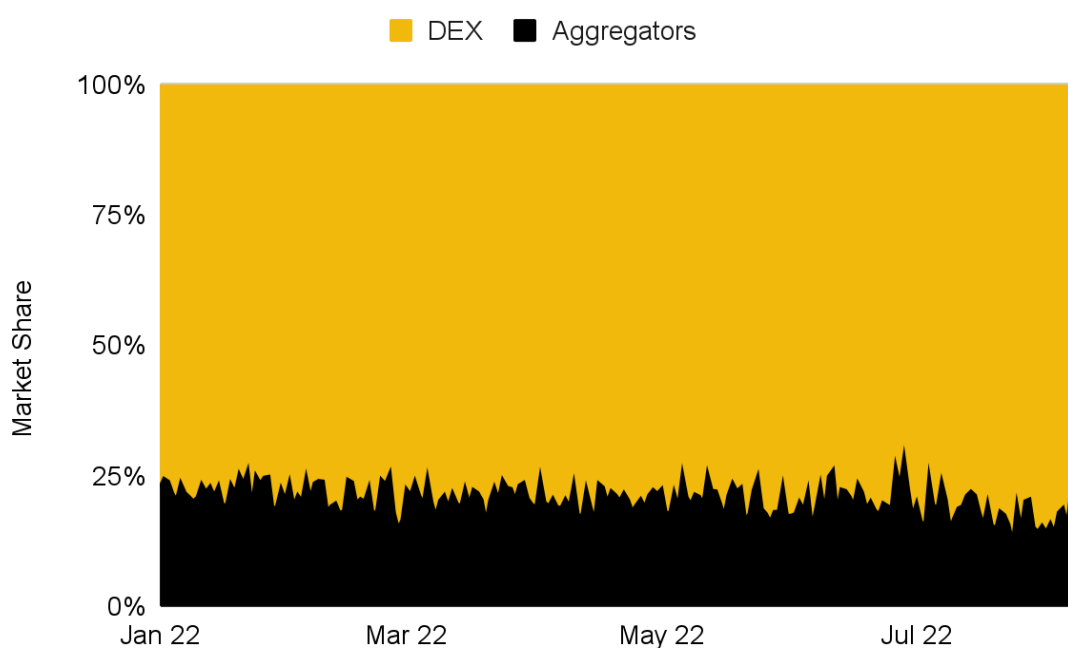
Current Developments and Future Outlook

The Role of Aggregators

Traders typically have one main goal in mind when they place an order - best execution. Given the vast number of DEXes in the market today, liquidity is split across a variety of DEXes and it would be very time consuming for traders to visit each DEX to find the best possible price for each trade they would like to place. This is where DEX aggregators such as 1inch, 0x API, and Matcha come in.

DEX aggregators intelligently route orders across different DEXes to optimize for the best execution price. **This is especially beneficial for large traders who are platform-agnostic, and where their primary focus is best execution.** While aggregators' market share has not been growing year-to-date, its share of the pie is not small. Today, aggregators have approximately 23% market share in terms of trading volume.

Figure 30: DEXes have a higher market share than aggregators (based on trading volume)



Source: Dune Analytics (@kryptonative), Binance Research

Looking ahead, there are three scenarios that may play out.

Scenario 1: Status Quo, DEXes remain the dominant players

In this case, a small number of DEXes will command the bulk of liquidity and as a result, dominate the market. Traders will source for best execution by visiting these few DEXes that tend to offer the best prices. It would be a competition for liquidity and smaller DEXes may find it hard to compete. DEXes will continue to control the user relationship.

Scenario 2: Aggregators overtake DEXes to facilitate the bulk of trades

In this scenario, traders will utilize aggregators to facilitate trades and the bulk of trading volume will be routed to DEXes via aggregators. In effect, DEXes will play the role of market makers and orders will primarily come from aggregators. Aggregators will control the user relationships.

Scenario 3: Wallets serve as the front-end interface for most trades

Here, traders will primarily interact with commonly-used wallets such as Metamask to swap tokens. Orders are routed through aggregators or DEXes, and wallets will control the user relationships.

While aggregators' market share have remained relatively stable, it is not unfathomable that this might increase over time given the value proposition of aggregators. A good reference material is the Aggregation Theory by technology analyst Ben Thompson²⁵ which describes how aggregators have come to dominate the industries they are in. The general idea is that successful aggregators have direct relationships with their customers and can help users reap value through discovery and curation. The end result is a control over end-user demand and a commoditization of suppliers. This is highly applicable to DEXes given that supply is undifferentiated and the primary focus of traders is best execution.

Aggregators can disrupt the DEX industry by allowing traders to access total liquidity in an ecosystem and end up controlling end-user demand.

Additionally, wallets such as Metamask have introduced swap features to facilitate trades between tokens, further fueling competition within the space. For example, despite a relatively high swap fee of 0.875%, Metamask has facilitated over US\$22B of cumulative trading volume since inception, with over 1.3M unique accounts.²⁶ **By streamlining the number of interfaces that a trader interacts with, and by aggregating DEXes' supply to provide low slippage trades, wallets have the potential to onboard a significant number of traders and change users' trading behavior.**

Strategy for DEXes

Importantly, the rise of aggregators and wallets implies that the true customers of DEXes are not traders, given that traders are platform-agnostic and may end up never interacting with the DEX. Instead, **the main focus of DEXes should be to improve the experiences of liquidity providers and to win a large share of liquidity in the market.** By doing so, a DEX would be able to position itself as the go-to DEX with deep liquidity and continue reaping trading fees even if most trades in the future end up being conducted through aggregators or wallets.

That said, traders remain an important part of the ecosystem and should not be neglected. DEXes should strive to build brand loyalty to increase user retention. A combination of token distribution, improved user interface / user experience (UI/UX), competitive fees, or additional platform features can be considered. **The goal is to increase user stickiness and find ways to grow the platform such that high switching costs reduce desire of users to move to other DEXes or aggregators.**

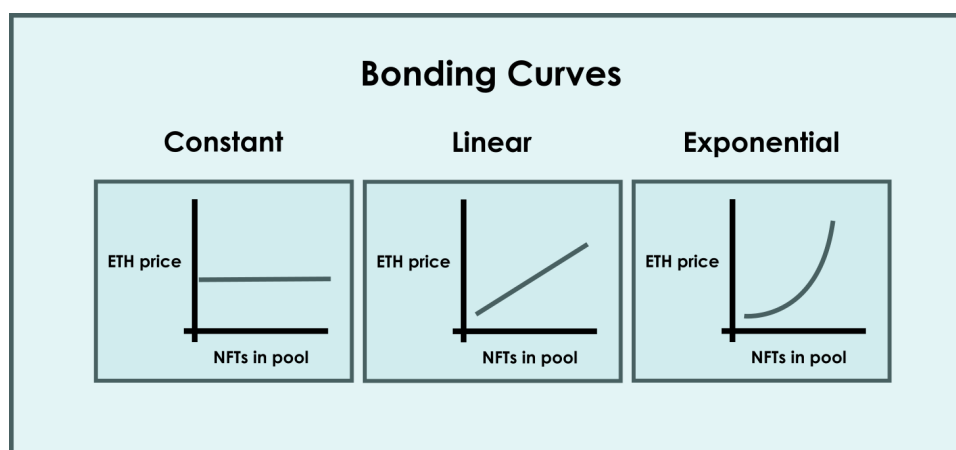
NFTs X DEXes

Over the past year, we have witnessed several market developments that have brought together the DeFi and NFT ecosystems. Specifically, we have seen new marketplace launches that have adopted the AMM technology traditionally associated with DEXes, and also an acquisition of a NFT aggregator by a major DEX. Given certain similarities between NFTs and DeFi in terms of market participants' trading behavior and underlying products (digital tokens), **it would be unsurprising to see further cross-adoption of technologies between both worlds in the future.**

AMM-based NFT Marketplaces

Currently, the bulk of NFT trading activities occur on NFT marketplaces such as OpenSea, Magic Eden, and X2Y2. While these have been widely adopted as the primary venues for NFT trading, there exists drawbacks to such auction-based marketplaces. The lack of instant liquidity for sellers, and the lack of yield for NFT owners have spurred some projects to develop alternatives to the current offerings.

For example, SudoAMM that was launched a few months ago adopted an AMM design and even the concentrated liquidity feature of Uniswap V3 to facilitate NFT transactions.²⁷ Similar to most DEXes, SudoAMM uses on-chain liquidity pools rather than off-chain order books to conduct swaps. LPs can deposit into single-sided buy or sell pools, or even deposit on both sides to capture fees. The bonding curve can be chosen when a pool is created, which determines how prices change as the supply of NFT in the pool changes.

Figure 31: Three kinds of bonding curves on SudoAMM*Source: Oxmons*

The use of bonding curves allow for deterministic and predictable pricing based on mathematical formulas, resulting in the availability of immediate buy or sell quotes. Traders in need of instant liquidity can sell their NFTs to the pool at potentially a lower slippage as compared to accepting the best offer on a NFT marketplace like OpenSea. Admittedly, a big limitation is the lack of differentiation between NFTs of different rarity. Nonetheless, the AMM model can be suitable for NFTs with similar rarity (e.g. gaming NFTs).

Overall, the adoption of an AMM design typically associated with DEXes is a novel way to reinvent and rethink how NFT transactions are settled. We look forward to continued development of NFT marketplaces as developers apply the best practices of DEXes, tweaking them to cater to the intricacies associated with NFTs.

Uniswap x NFTs

Uniswap announced the acquisition of NFT aggregator Genie a few months back in June 2022, marking the first major acquisition of a NFT aggregator by a DEX.²⁸ The acquisition allows Uniswap to integrate NFTs into its products and ushers in the possibility of NFT trading on Uniswap.

“In pursuit of our mission to unlock universal ownership and exchange, today we're expanding our products to include both ERC-20s and NFTs.”
- Uniswap

Over the past year, there has been a considerable amount of attention on NFTs. Trading volume has also been high with the 1-year trading volume exceeding \$35B as of end-July 2022.²⁹ The acquisition by Uniswap looks strategic, allowing the leading DEX to expand its product suite and gain a foothold in the growing NFT market. Moreover, if executed well,

Uniswap could cement its brand image as the go-to protocol for both fungible and non-fungible tokens.

Overall, it remains to be seen if more cross-vertical acquisitions will happen. If any, acquisitions in a challenging market environment will likely be done by the more prominent DEXes with a larger balance sheet. Nonetheless, such **business acquisitions could be positive for technological development of the space as protocols look to harvest the synergies in these NFTs X DEXes deals.**

Closing Thoughts

The competitive market landscape has compelled most DEXes to bootstrap growth through the emissions of native tokens to attract liquidity and retain users. The consequence is that many of the DEXes today are unprofitable and are likely to remain so at least for the foreseeable future. Understandably, this is not too different from the typical playbook employed by many early-stage startups to operate at a loss and prioritize growth in the short-term. While short-term unprofitability is not uncommon, cash burn can be concerning. DEXes need a concrete business plan to achieve operating profit and business sustainability. At the end of the day, cash is limited and highly inflationary tokenomics are unlikely to be sustainable in the long-term.

As the crypto ecosystem matures and as more sophisticated investors come into the space, financial ratios and operating metrics are increasingly scrutinized. Fundamentals are important and investors today should consider both qualitative and quantitative aspects of a DEX before making any investment decision. Our analysis reveals that certain DEXes today trade at more reasonable valuations than others.

Besides competition between DEXes, aggregators and wallets also pose a competitive risk to DEXes by providing value-add through easy price discovery or streamlined user interfaces. To maintain their edge, DEXes can build a competitive moat by deepening liquidity, expanding their product suite, or finding alternative sources of revenue streams.

Overall, DEXes are undoubtedly one of the most important verticals of DeFi today. Besides facilitating billions of dollars in trading volume everyday, DEXes play a key role in the development of a decentralized future by offering a permissionless and open solution for trading. The competitive market landscape will spur further innovation in the space and consequently, benefit the overall ecosystem and its users.

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