BINANCE
—RESEARCH

Half-Year Report 2023

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1 **Key Takeaways**

◆ While the first half of 2023 has not been without challenges for the industry, the crypto market has shown resilience, with crypto market capitalization ending the period in positive territory.

◆ Bitcoin market dominance ended the half-year at its highest level since April 2021, while its year-to-date price performance of over 87% significantly outperformed many common TradFi investments. Bitcoin's correlation with TradFi is now also at multi-year lows. Ordinals and Inscriptions have reverberated throughout the wider Bitcoin ecosystem with new energy, and we expect to see continued development and innovation in the next few months.

◆ L1s had an eventful first half. Ethereum's liquid staking reached new highs, birthing LSTfi, as BNB Chain focused on scalability. Solana bounced back after a tumultuous 2022 and released a Web3 phone, while Tron's USDT dominance continued to grow. Avalanche progressed on subnets and corporate partnerships, while Cosmos advanced on shared economic security models.

◆ While optimistic rollups continued to dominate, the ZK world reached new heights with the launch of the first fully functional zkEVMs. Many major players laid out their future visions, largely converging around the idea of networks of blockchains, i.e., L3s, Superchains, Hyperchains, etc.

◆ Despite a 7.0% decline in global stablecoin market value, shifts in adoption trends, regulatory landscapes, and the approaches adopted by certain players have significantly reshaped the sector's market composition. Among these changes, USDT has experienced a remarkable 25.8% increase in market share year-to-date ("YTD"), resulting in its departure from the major trio of stablecoins.

◆ Notable developments have emerged in DeFi since the beginning of the year, largely attributed to the remarkable ascent of liquid staking, which has become the largest sub-sector, alongside the increasing migration of users towards DEXes. While the sector continues to unlock newer use cases, DeFi's dominance experienced a 0.5% decline compared to the global crypto market.

◆ NFTs experienced higher trading volume in H1 2023 as compared to H2 2022, largely driven by heightened activity on the Blur marketplace in the earlier part of the year. However, NFTs have underperformed the broad crypto market as the floor prices of many NFT collections have declined YTD.

◆ Gaming-related tokens have largely edged higher in price throughout the first half of 2023, benefiting from the broader market recovery. Currently, more than 67% of games are built on BNB Chain, Ethereum, and Polygon.

◆ The first half of 2023 extended a decline in overall crypto deal activities with a fall in venture capital funding. A clear area of interest has surfaced, with the infrastructure sector attracting the most investments, followed by gaming/entertainment and DeFi.

② Introduction

As we approach the two-year mark since the crypto market peak in late 2021, it's timely to take a step back to examine the state of the market and the developments that have unfolded. The first half of 2023 has definitely not been smooth sailing for the industry, but the market has shown resilience, with crypto market capitalization ending the period in positive territory on a quarterly, half-yearly, and annual basis.

Figure 1: Crypto market capitalization over the past year

Total crypto market capitalization ("market cap") has risen by 30.3% on a year-on-year basis ("YoY"), closing at US$1.17T on June 30, 2023, compared to US$0.90T a year earlier. This highlighted a remarkable period of recovery following a turbulent 2022 with the depegging of UST and the shutdown of a few centralized entities.

Despite the ongoing regulatory and macroeconomic uncertainties that reverberated through the first half of 2023, total market capitalization has enjoyed a huge upswing, with an impressive 47.0% growth in Q1. This came on the back of the strong performance of risk assets across the board in the first quarter. Q2 was yet another positive quarter, although regulatory overhangs weighed on performance. Markets were met with much relief in the latter part of Q2 as traditional firms signaled their commitments to the space. Notable traditional finance managers have filed their applications for spot Bitcoin ETFs, and technology giants have announced various initiatives involving blockchain technologies. Overall, **on a year-to-date ("YTD") basis, total crypto market cap rose 47.6%.**

3 The Layer-1 ("L1") Landscape

3.1 Bitcoin

It has been an eventful first half of the year for Bitcoin. **Driven by technical developments, including the advent of Ordinals, Inscriptions, and BRC-20 tokens, a [new era for Bitcoin](#) emerged in 2023.** While headlines over the last few years have often focused on smart contract behemoths like Ethereum, BNB Chain, and Solana, this year, Bitcoin has done well to reclaim its place, both in the headlines and in market dominance. As we can see in Figure 2, through the first half of the year, **Bitcoin increased its market dominance from 40.4% to 50.5%**, once again commanding over half of the total crypto market capitalization.

Figure 2: Bitcoin demonstrated a sharp increase in market dominance in H1 2023
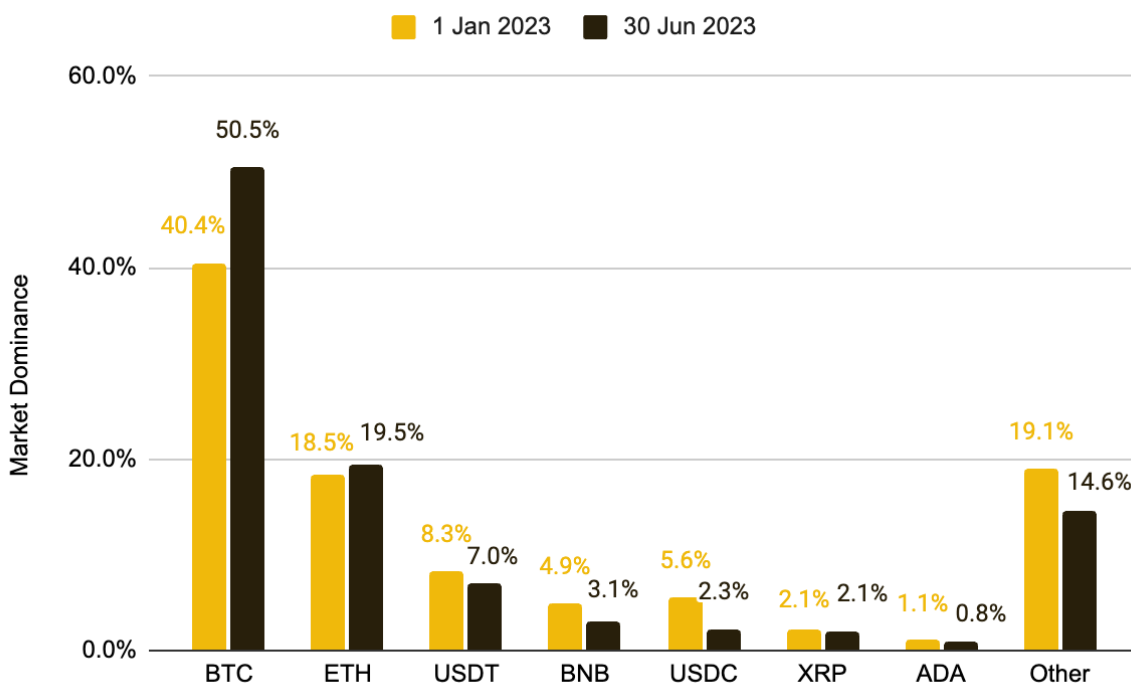
Source: CoinMarketCap, Binance Research

When looking at the top crypto assets, Ethereum and Ripple showed slight increases in market dominance. However, the majority of other top assets declined. Combining this with the fact that the overall crypto market cap grew across H1 2023[1], it would indicate that money moved from alternative assets into Bitcoin.

In this section, we explore some key Bitcoin metrics and how they have evolved so far this year. We then examine some of the primary narratives and developments that have underpinned these metrics and what we can expect for the remainder of the year.

Metrics

Figure 3: Bitcoin has had a strong first half of the year

	1-Jan-23	30-Jun-23	% change
Financial			
Market Cap (US$B)	321.3	602.9	87.7%
Trading Volume (US$B)	9.2	26.4	185.4%
Network			
Transactions (7DMA)	246.1K	389.2K	58.1%
Active Addresses (7DMA)	879.1K	972.8K	10.7%
Average Tx Fee (US$, 7DMA)	1.18	2.87	143.2%
Lightning Network Capacity (US$M)	87.8	170.3	93.4%
Mining			
Hash Rate (EH/s, 7DMA)	256.7	358.4	39.6%
Mining Difficulty (T)	35.4	50.6	43.4%

Source: CoinMarketCap, The Block Data, Blockchain.com, Binance Research
7DMA = 7-day moving average

- ◆ **Financials:** The financial metrics are the simplest illustration of the bullish six months we have experienced for Bitcoin. **Its market cap increased 87.7% over the half-year, nearly double the total crypto market cap, which increased by 47.6%.** Trading volume for the biggest crypto asset also demonstrated a significant increase of 185.4%.

- ◆ **Network metrics:** The **impact of Ordinals, Inscriptions, and BRC-20 tokens is most evident when looking at how Bitcoin's network metrics have evolved** over the past half-year. The number of transactions, as measured by a 7-day moving average, is up by over 58%, while the number of active addresses is up 10.7%. This is **indicative of previously inactive or new users interacting with Bitcoin, as well as an increased volume of interactions by previously active users**. The average transaction fee value is also up quite a bit, rising by 143.2%. This has been a somewhat controversial issue in the community, with **some understanding that higher fees are a necessary consequence of blockchain usage and create demand for Bitcoin Layer-2 ("L2") solutions, while others have been more concerned about potential ramifications for Bitcoin's use case as hard money**. More details on this debate are available in the "Community Response" section of our BRC-20 report. Whenever one stands on the issue, the demand for Bitcoin scalability has undoubtedly become a more pronounced issue in the market. This is quite evident in the fact that the **capacity of the Lightning Network, one of Bitcoin's original L2 scaling solutions, has now reached an all-time high** and is up over 93% this year.

- ◆ **Mining:** From a Bitcoin mining perspective, both key metrics have also been on a notable uptrend. The average **hash rate, which is a measure of the combined computational power dedicated to Bitcoin mining, is up nearly 40% this year**. This can be seen as a positive development, as the **hashrate is an important metric to measure blockchain security**. Essentially, the more computing power dedicated to Bitcoin mining, the higher the hashrate and the harder it becomes for attackers to disrupt the network. Specifically, the higher the hash rate, the harder it is for a 51% attack to take place on the Bitcoin network. Closely related to the hash rate is the level of mining difficulty, which is up over 43% this year. **Mining difficulty determines how difficult it is to find a hash below a given target, i.e., to mine a Bitcoin block.** The difficulty adjusts automatically in accordance with the Bitcoin algorithm; a higher difficulty means that it will take more computing power to mine the same number of blocks, making the network more secure against attacks. Thus, the **increase in mining difficulty can be seen as another positive security-related development** for Bitcoin. The **increase in mining difficulty and hash rate is a direct result of more miners joining the network and existing miners adding more computing power to mining.** This increase might be due to a multitude of factors, including the upcoming Bitcoin halving next year, but it is also at least partially due to the popularity of developments like Ordinals, Inscriptions, and BRC-20 tokens. These new innovations have led to increased transaction fees for miners and created new revenue models, i.e., mining custom blocks for users looking to mint large Inscriptions.

Overall, the data illustrates positive growth and activity in several key areas of the

Bitcoin network over the last six months. The metrics indicate a generally positive market sentiment and increased user engagement with Bitcoin.

Sentiment Analysis

We can also consider metrics related to Bitcoin sentiment analysis. These metrics provide insights into the collective attitudes expressed by market participants and the general public towards Bitcoin.

Firstly, we can look at the Bitcoin Fear & Greed Index, **a popular sentiment indicator used to gauge market attitudes and investor psychology surrounding large cryptocurrencies such as Bitcoin**. It provides values between 0 and 100, with values below 50 representing periods of "fear" and those above 50 representing periods of "greed." It uses a variety of factors and data points to calculate this, including market dominance, trading volume, Google trends, social media sentiment, price volatility, etc. As seen in Figure 4, this metric has fluctuated through the last six months but increased overall from the mid-20s level to the mid-50s. While not a complete measure of any sort, this **does indicate a generally bullish sentiment for Bitcoin throughout the year and can be interpreted as an overall positive move.** In fact, given the fact that the index has largely fluctuated between the 45 and 65 mark since February (around when Ordinals and Inscriptions started becoming popular), we can interpret a generally positive sentiment around Bitcoin through most of this year so far.

Figure 4: The Bitcoin Fear & Greed Index has increased over the last six months
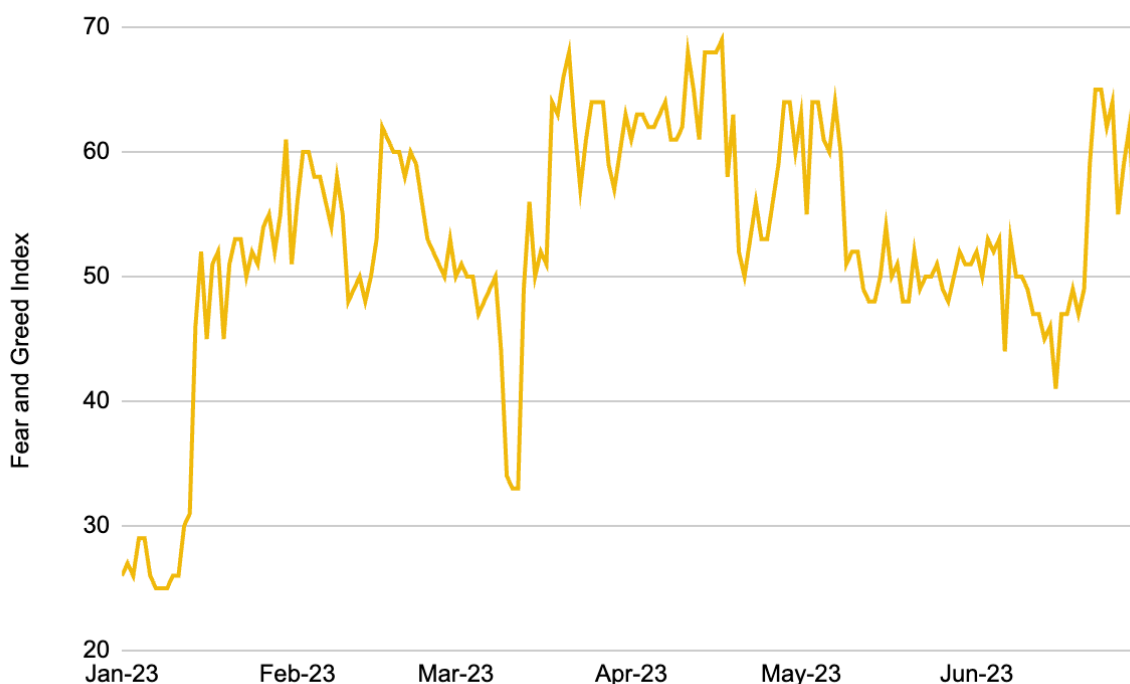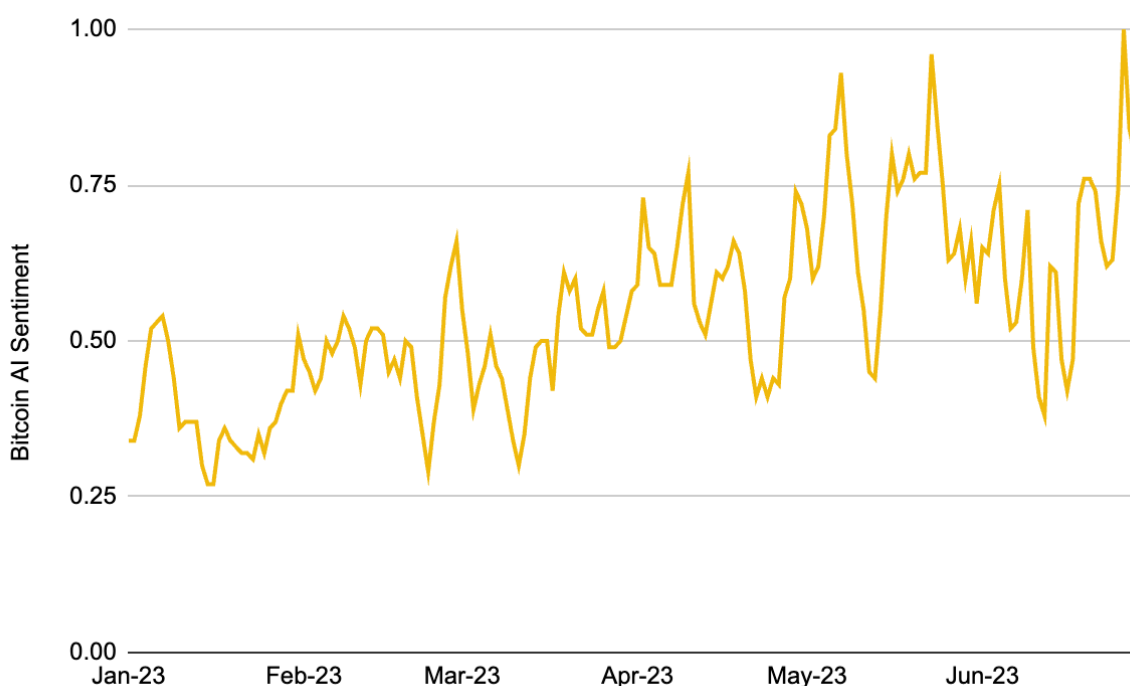

Source: Alternative.me, Binance Research, as of June 30, 2023

Looking more closely at other sentiment metrics, we can also **analyze the [Bitcoin Bull & Bear Index](#)**. This index collects data from Twitter, Reddit, and Bitcoin Talk and uses an AI model to analyze the collected data according to 93 different sentiment measures. This metric further points to a bullish six months for Bitcoin, having increased 153% from 0.34 to 0.86 over the last six months. Given that the **underlying data comes from a mix of widely cited and influential sources, this can also be interpreted as a positive gauge for how the broader non-crypto market has been considering Bitcoin this year.**

"This index collects data from Twitter, Reddit, and Bitcoin Talk and uses an AI model to analyze the collected data according to 93 different sentiment measures. This metric further points to a bullish six months for Bitcoin, having increased 153% from 0.34 to 0.86 over the last six months"

Figure 5: AI-driven Bitcoin sentiment is up quite significantly through this year so far

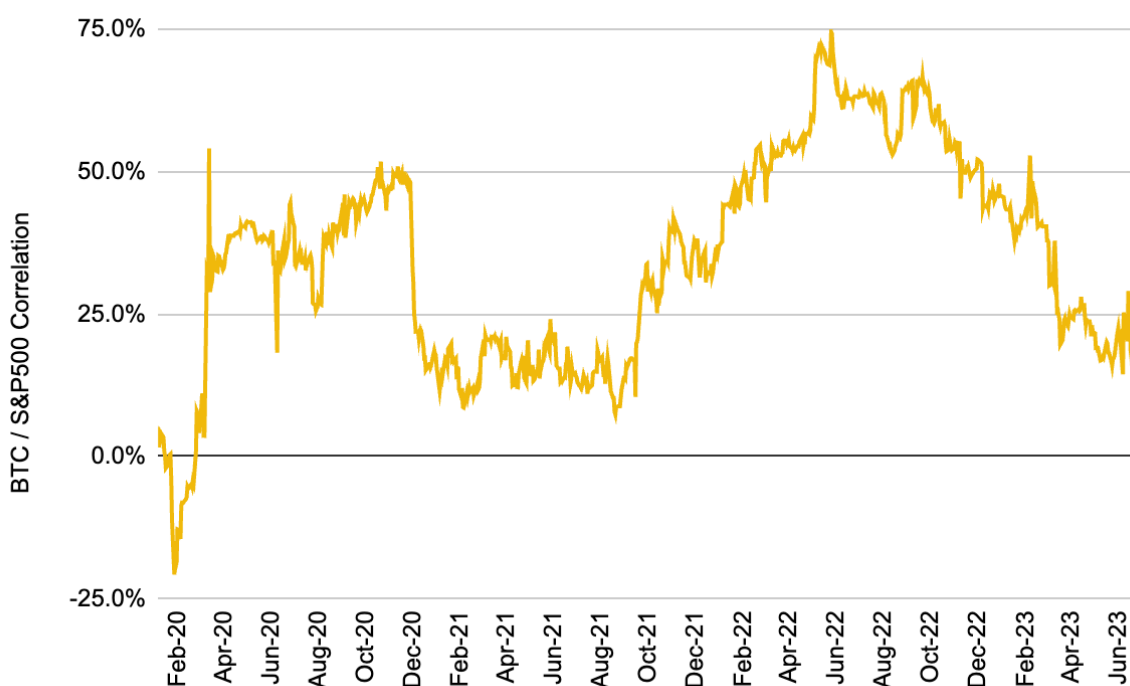Source: Augmento.ai, Binance Research, as of June 30, 2023

While sentiment analysis can provide valuable insights, we should note that it relies heavily on data interpretation and thus can be subjective and influenced by biases. However, when considered in combination with the technical and fundamental trajectory of Bitcoin this year, we can perhaps view our positive interpretations of this data with more certainty.

Correlation to Traditional Finance ("TradFi")

Bitcoin's relationship with TradFi markets has been consistent but dynamic. In the past, the correlation between Bitcoin and the S&P 500 fluctuated between -20% and 20%. However, in mid-2020, the correlation experienced a significant surge, eventually reaching an all-time high in May 2022 at approximately 75%. This increase occurred as central banks worldwide began raising interest rates.

Previously, Bitcoin was often considered a potential diversification tool for investment portfolios because its price movements were largely independent of traditional risk markets. However, this perception changed last year. Nevertheless, in 2023, the correlation has returned to its previous pattern. **Bitcoin's correlation with the S&P 500 is currently at its lowest level in over three years**, revitalizing the argument for Bitcoin as a portfolio diversifier. The correlation has declined from around 45% in January to just 7% by the end of June, compared to an average of 56% throughout 2022.

Figure 6: Bitcoin's correlation with the S&P 500 is at its lowest in over three years
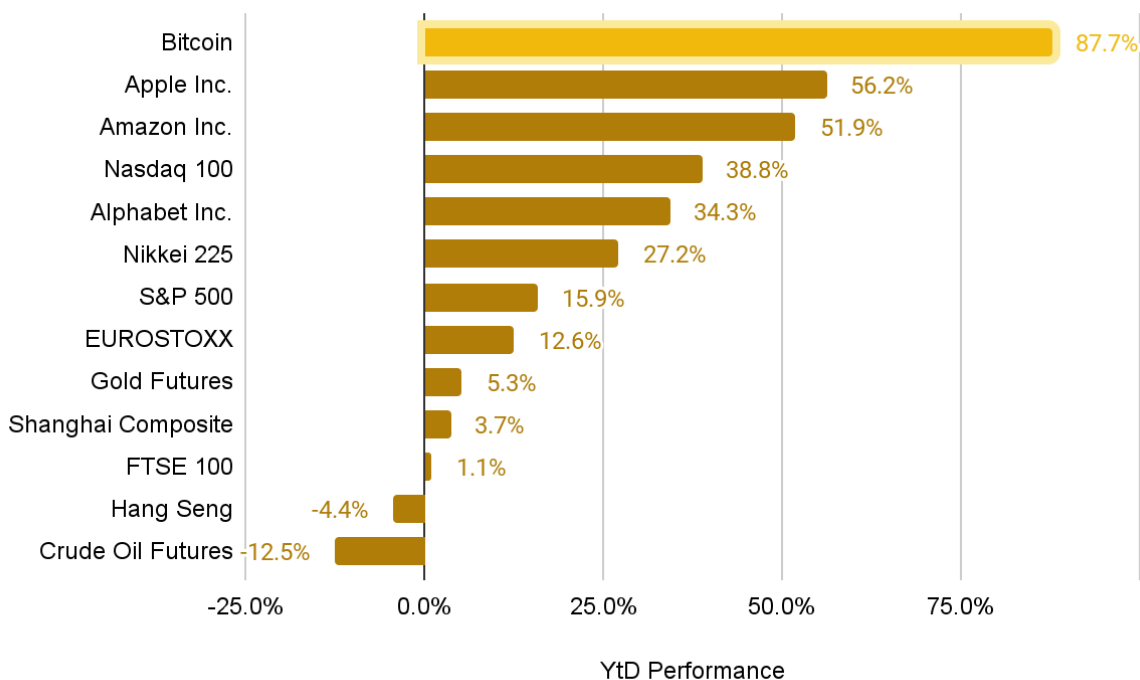

Source: Coin Metrics, Binance Research, as of June 30, 2023

Comparing Bitcoin's performance to other TradFi investment options, Bitcoin comes out on top with its 87.7% year-to-date gain. Apple and Amazon stocks are the only other investments in our comparison group that are up over 50% this year. The major stock market indexes are much further behind, with many displaying single-digit returns while others are negative for the year. **Gold, a commonly touted alternative, is up only 5.3%, while crude oil futures are down quite heavily.** This chart further helps illustrate Bitcoin's

potential diversification benefits and strong performance compared to a purely TradFi portfolio.

Figure 7: Bitcoin was the best performer among a group of popular TradFi investments

Source: Wall Street Journal, Binance Research, as of June 30, 2023

Ordinals

One of the key drivers for Bitcoin this year has been the rise of Ordinals. While we cover this development in more detail later in this report and in our recent A New Era for Bitcoin report, we had to at least mention it here.

Ordinals work by running ORD, an open-source software that can run on top of any Bitcoin full node, which enables the tracking of individual Satoshis ("sats") based on what founder Casey Rodarmor[2] termed "Ordinal Theory." This ascribes a unique identifier to every single sat on Bitcoin. Going one step further, these **individual sats can be "inscribed" with arbitrary content such as text, images, or video to create an "Inscription," i.e., a Bitcoin-native digital artifact, or what can also be called an NFT.** The first Inscription was minted in December 2022. By early April this year, the number of Inscriptions had crossed 1M, and the month of May saw a frenzy where this figure increased from around 2M to over 10M. As of the time of writing, **there have been over 16M Inscriptions minted on the Bitcoin blockchain, generating over US$55M in fees**[3].

These Inscriptions had a significant impact on various metrics of Bitcoin, such as average block size, mempool growth, transaction fees, and the number of full node operators. Our previously mentioned report provides more detailed coverage on this topic. However, the

most noteworthy impact on Bitcoin was not purely technical but rather qualitative. **The introduction of Ordinals sparked excitement and spurred innovation within the Bitcoin community**, which had been somewhat lacking in recent times. Established Bitcoin applications like Hiro, Xverse, and Gamma quickly embraced and integrated ordinals support, while market incumbents like Magic Eden and Binance NFT Marketplace[4] also joined in. Prominent NFT studios such as Yuga Labs and DeGods were among the early adopters in entering the Ordinals market. While there was initial debate within the community regarding how these developments would affect Bitcoin's intended use as a form of hard money, ongoing innovation and development within the Bitcoin ecosystem have largely overshadowed these concerns. Ultimately, continuous innovation is necessary to create new and exciting use cases that can drive widespread adoption. This is where the next chapter of the Bitcoin story, BRC-20 tokens, comes into play.

BRC-20

First conceptualized in March 2023 by pseudonymous Crypto Twitter user domo[5], **BRC-20 is an experimental token standard that enables the deployment, minting, and transferring of fungible tokens on the Bitcoin blockchain**. Between BRC-20s and Inscriptions, both fungible and non-fungible tokens have now become part of the broader Bitcoin ecosystem. The idea behind BRC-20s is that JSON[6] data (which is a text-based format) can be inscribed onto individual sats via the Ordinal Protocol to create these fungible tokens.

The **first token contract to be deployed was for the ORDI token**, which had a limit of 1K tokens per mint and a 21M maximum supply (in homage to Bitcoin's 21M maximum supply). The launch created a buzz, and all 21M tokens were minted in less than 24 hours. Soon after, many other tokens emerged, and the market cap even peaked at over US$1B in early May. ORDI remains the most successful and popular token, with listings on several prominent exchanges. **As of the time of writing, there are over 31K BRC-20 tokens, with a combined market cap of around US$314M.**

Figure 8: The top five BRC-20 tokens by market cap

Logo	Ticker	Market Cap (US$M)	24H Volume (US$K)	Total Supply (M)
	ORDI	142.8	24.7	21
	VPMX	18.8	48.1	109
	OXBT	11.3	112.0	200

	OSHI	10.2	23.0	0.013
	WHEE	6.3	4.8	21

Source: ordspace.org, Binance Research, as of June 30, 2023

Despite "BRC-20" being a play on Ethereum's "ERC-20" token standard, there are significant differences between the two. Most notably, BRC-20 tokens do not have any degree of smart contract compatibility and thus have relatively limited functionality. Furthermore, the market infrastructure for BRC-20s is far less developed. Naturally, this is a function of the lack of maturity in the BRC-20 token market when compared to ERC-20s, which have been around for many years.

Similar to Inscriptions, **BRC-20s have had a noticeable impact on Bitcoin's metrics.** In The Rise of Bitcoin NFTs, a later section of this report, we describe how BRC-20-based Inscriptions largely came to dominate the market, crowding out Bitcoin NFTs. As expected, Bitcoin's mempool, transaction fees, and block size were impacted, and the **community debate was rejuvenated**. Many prominent members were happy to see the increase in fees, particularly as it helps create a more sustainable market for Bitcoin miners, who are primarily compensated by block rewards (which halve every four years). Others were more critical and saw the increase in fees as an issue for crowding out peer-to-peer transactions in countries where Bitcoin is relied upon as an alternative to the local fiat system. While this is certainly true, the question we should ask is: if users want to send US$10 to their friends, must they transact on the Bitcoin L1? This is exactly why the Lightning Network exists: for fast and cheap peer-to-peer payments. **Fees would also increase if Bitcoin reached a few million new users, so to blame Inscriptions and BRC-20s is largely illogical, as fees were bound to go up if mass adoption took hold**. Instead, the focus should be on making it easier and more efficient to onboard onto the Lightning Network and to continue work on the L2 solutions for Bitcoin so that transactions can occur on a layer below the Bitcoin L1. **Given the new energy reverberating through the Bitcoin ecosystem, we are optimistic that teams already working on solutions have more drive and desire to work on scalability and that new builders have joined the ecosystem to create their own solutions.**

To learn about BRC-20s in more detail, make sure to check out our recent report, BRC-20 Tokens: A Primer.

What Do We Expect Going Forward?

If Ordinals, Inscriptions, and BRC-20s have shown us anything, it's that innovation is alive and well in the Bitcoin ecosystem. Our expectations going forward consist of the following:

1. **Bitcoin L2s:** The impact on Bitcoin's key metrics from the frenzy around Inscriptions and BRC-20 has illustrated that **Bitcoin is not scaling to match its grand ambitions of millions and even billions of users**. If a few million more people decide to use Bitcoin for peer-to-peer payments, we would have the same result of spiked fees and crowded blockspace. Thus, if anything, these developments can be treated as a warning sign for the future. The use case for Bitcoin L2s is clear, and this is an area that developer attention should be focused on. The Lightning Network has been a great start, and continued capacity growth is a great sign. However, it also has its limitations, which we won't discuss here. More L2s are needed on Bitcoin, and we expect this to be a key area of focus in the coming months. **Stacks' upcoming sBTC release**[7] looks interesting, while **Lightspark's "enterprise-grade" solution**[8] for onboarding businesses onto the Lightning Network is also something to note. **Spiral**, the Jack Dorsey-backed Bitcoin open-source development platform, is also doing some interesting work on its **Lightning Development Kit ("LDK") project**[9].

2. **Infrastructure development:** The lack of infrastructure around Inscriptions and BRC-20s, at least when they initially launched, was notable and very much lacking compared to more developed ecosystems like those of Ethereum and BNB Chain. **Everything from the trading process to fiat on-ramps to cross-chain capabilities has a long way to go, and we imagine many projects and builders focusing their energy around this.** Bitcoin Frontier Fund's accelerator program and its startups[10] might be interesting to pay attention to in this regard.

3. **Innovation in token design:** As mentioned above, BRC-20 tokens are relatively simple with limited flexibility. More design variations have already emerged in the form of ORC-20 tokens and even SRC-20s. We are sure that development in this space will also continue, with **many builders looking to create everything that is possible on other chains, like Ethereum and BNB Chain, on top of Bitcoin.** Significant building and innovation are required for this initiative, and new token designs are bound to be a central part of this next chapter for Bitcoin.

3.2 The Other L1s

With Bitcoin having had such an eventful start to the year, it will come as no surprise that the other L1s have also been innovating at a fast pace. In this section, we take a look at the other major L1s, their most notable highlights from 2023, and what we can expect going forward.

Overview

Figure 9: A summary of where things stand for the major L1s (and Polygon PoS)

	Ethereum	BNB Chain	Solana	Tron	Polygon PoS	Avalanche
Financial						
Market Cap (US$B)	232.4 *(58.1%)*	37.5 *(-4.1%)*	7.6 *(105.9%)*	6.9 *(35.9%)*	6.2 *(-7.2%)*	4.5 *(32.7%)*
Trading Volume (US$M)	12,895.1 *(437.4%)*	626.9 *(125.0%)*	1,120.4 *(476.9%)*	229.1 *(128.5%)*	464.4 *(336.2%)*	252.4 *(163.6%)*
Total H1 2023 Revenue (US$M)	1,100	10.9	3.5	433.6	14.7	6.3
Network						
Daily Txs (M)	1.1 *(48.0%)*	4.9 *(113.0%)*	21.0 *(13.5%)*	7.1 *(7.6%)*	2.7 *(3.9%)*	1.1 *(-59.3%)*
Daily Active Addresses (K)	375.5 *(63.1%)*	1,520.2 *(117.9%)*	331.8 *(-20.6%)*	2,230.4 *(122.1%)*	422.3 *(15.7%)*	106.6 *(207.2%)*
Average Tx Fee (US$)	6.5 *(63.1%)*	0.09 *(-61.1%)*	0.002 *(35.9%)*	0.06 *(24.6%)*	0.02 *(38.6%)*	0.097 *(61.6%)*
Ecosystem						
Staked Supply	16.9%	14.6%	70.6%	41.2%	38.6%	61.6%
Total Developers (as of June 1, 2023)	5,946	548	1,475	67	837	308
DeFi TVL	44.8 *(49.5%)*	3.5 *(-25.5%)*	0.5 *(50.0%)*	5.7 *(39.0%)*	0.9 *(2.2%)*	0.8 *(-2.5%)*

Source: CoinMarketCap, Token Terminal, Artemis.xyz, Block Explorers, Flipsidecrypto.xyz, stakingrewards.com, Electric Capital, DeFi Llama, Binance Research. Data as of June 30, 2023.
The percentages in parentheses indicate how the metric has evolved from January to June.

Note: Although Polygon is not a traditional L1 by definition, the Polygon PoS sidechain operates more analogously

Ethereum

Financial metrics show that Ethereum remains the leading L1, beating the others in market cap, trading volume, and revenue generation by some margin. However, **network metrics have clearly been impacted by the relatively high average transaction fee**, and other competitors are ahead in this aspect. This further **illustrates why Ethereum L2s have become such a [crucial part](#) of the ecosystem** in recent months. The base L1 is simply unaffordable for many users, and the only way they can interact is via the cheaper L2s. Developer and DeFi metrics are strong, although staked supply still has some way to go compared to some competitors.

- ◆ **Shanghai Upgrade and the uptick in ETH staking:** One of the key narratives for Ethereum heading into 2023 was that of the [Shanghai Upgrade](#), which **enabled withdrawals of ETH that had been staked since the Beacon Chain launched in December 2020**. While the upgrade was widely touted as a potential source of volatility, the reality was different. After the hard fork on April 12, ETH's market cap[11] jumped over 11% in the next few days and remains higher as of the time of writing. Even more interestingly, **since Shanghai, over 5M ETH of inflows have been recorded in the staking contract.** Clearly, the demonstration of being able to withdraw staked ETH without any issues has encouraged more users to stake.

**Figure 10: ETH staking has been dominated by inflows since the Shanghai Upgrade**
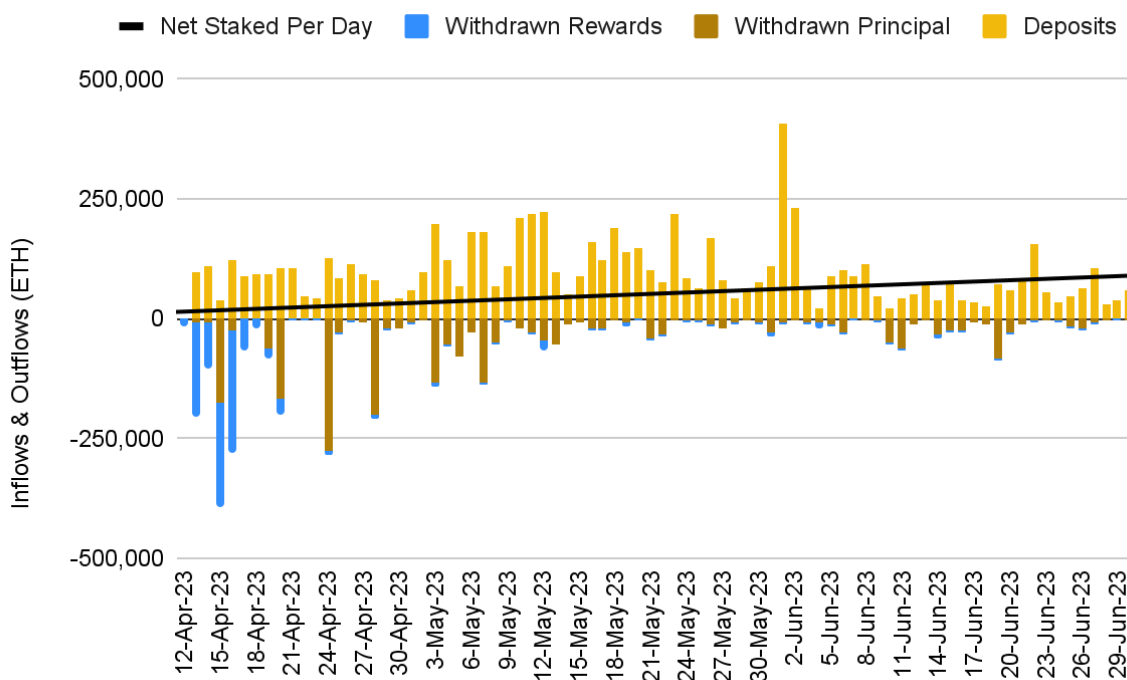
Source: Dune Analytics (@hildobby), Binance Research, as of June 30, 2023

◆ **Liquid staking reaches new heights:** As a brief recap, liquid staking allows users to stake their proof-of-stake ("PoS") tokens to earn yield while retaining the liquidity of their token via a liquid staking token ("LST"). Examples of ETH LSTs include Lido's stETH, Rocket Pool's rETH, and Binance's BETH. This was a particularly important innovation pre-Shanghai, as users were previously unable to freely withdraw their staked ETH. Thus, LSTs have provided valuable liquidity while still allowing users to earn an ETH staking yield. Interestingly, **growth continues to be extremely strong post-Shanghai, with liquid staking being the most common way for users to stake ETH.** Users clearly value the freedom to delegate the task of managing staking infrastructure (which could be burdensome for less experienced users) to another party while also benefiting from the liquidity that LSTs can provide. In fact, **since April, liquid staking has been the top-ranking DeFi category[12] by total value locked ("TVL"), having dethroned DEXes.**

Make sure to check out our new report, [Data Insights: Liquid Staking and LSDFi Heat Up](#), to get the latest on liquid staking, LSTs, and more.

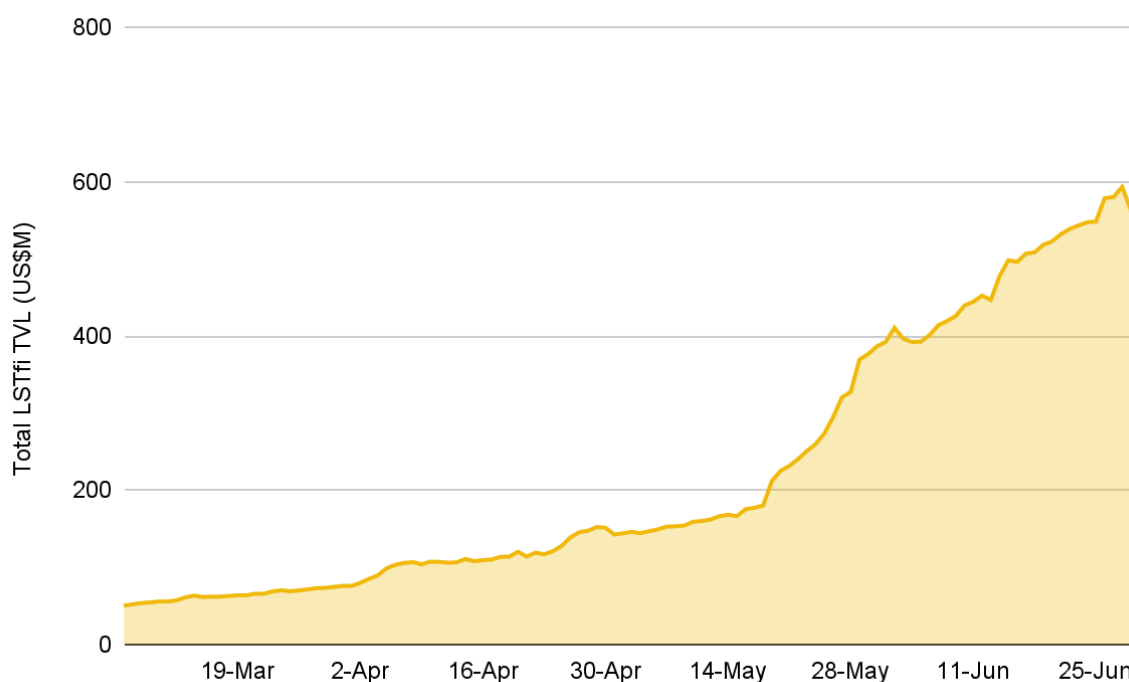**Figure 11: Liquid staking commands 37.1% of the total ETH staking market**
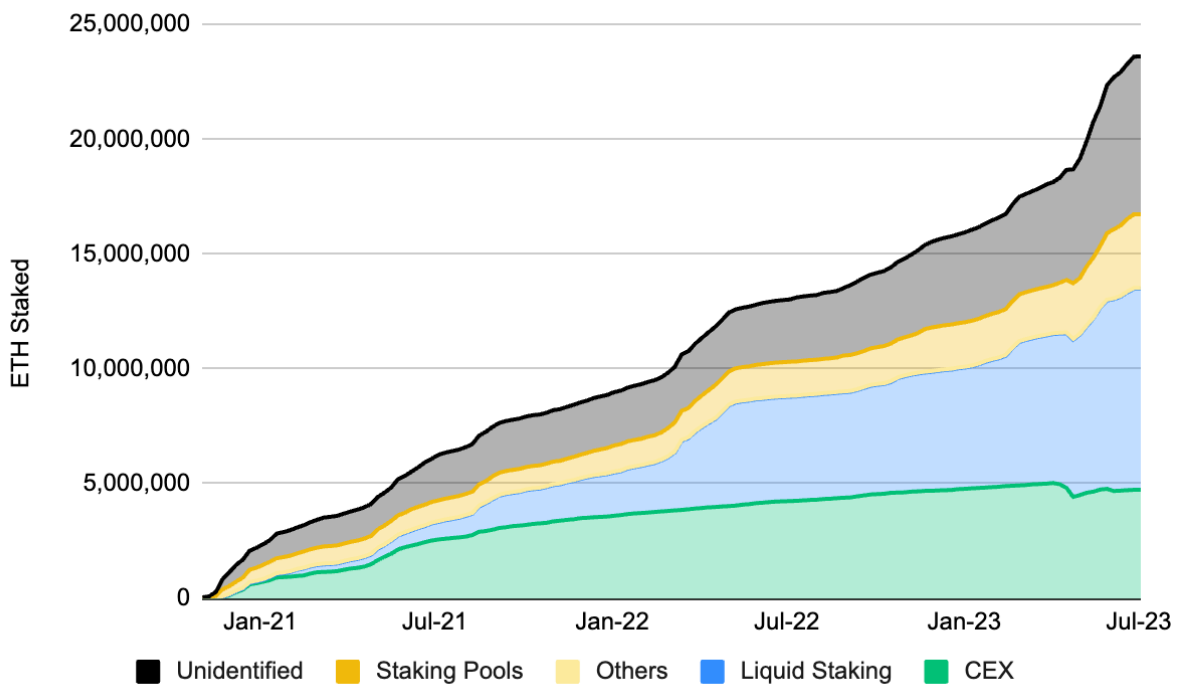
Source: Dune Analytics (@hildobby), Binance Research, as of June 30, 2023

◆ **Emergence of LSTfi:** The latest innovation in the world of staking, **LSTfi (sometimes also referred to as LSDfi) can be seen as a marriage between liquid staking and DeFi.** LSTfi protocols offer yield-generating opportunities for holders of LSTs (sometimes also referred to as LSDs). These include yield-trading protocols,

indexing services, projects that allow users to mint stablecoins using their LSTs as collateral, etc. At this early stage, the market is relatively concentrated among the top protocols, although we expect this to change as more new projects enter in the coming weeks and months. The **relatively low staked ETH percentage is a potential structural tailwind for this sector** (as outlined in Figure 9).

To learn more about this growing market, check out our recent report, LSDfi: When Liquid Staking Meets DeFi.

**Figure 12: LSTfi TVL grew by 67% throughout June 2023**

BNB Chain

BNB Chain boasts strong market cap and trading volume numbers. Its extremely low fees help it excel in terms of daily transactional activity and maintain a strong and consistent user base. DeFi TVL is the third-highest among our cohort, and similar to Ethereum, staked supply is on the lower end for now.

◆ **Focus on scalability with opBNB:** BNB Chain maintains a strong focus on scalability and recently introduced opBNB to continue this journey. **opBNB is an L2 solution that leverages Optimism's OP Stack (learn more here) to build an optimized scaling solution for BNB Chain.** opBNB is EVM-compatible, capable of over 4K transactions per second ("TPS"), with transaction fees lower than US$0.005[13]. This combination makes opBNB potentially attractive to developers working on

applications that require high-frequency microtransactions, e.g., gaming. opBNB's testnet went live on June 19, and it is currently open for feedback from developers and users. We look forward to the mainnet launch and seeing what sort of dApps it can attract.

◆ **Decentralized data storage with BNB Greenfield:** BNB Greenfield provides decentralized data storage infrastructure within the broader BNB Chain ecosystem. It is a **storage-oriented blockchain where users can create, store, and exchange data that they fully own.** With the use of a native cross-chain bridge, all of the data stored in BNB Greenfield can easily be transferred to BNB Smart Chain, where it can be used by BNB Chain dApps and any new BNB Greenfield dApps. **Use cases include website hosting, cloud storage, blockchain data storage, publishing, personal data markets,** etc. More details can be found on the official website here. BNB Greenfield is currently in testnet[14] and has also released a detailed whitepaper.

Figure 13: BNB Greenfield's ecosystem is envisioned as a trinity of entities working together to provide a novel decentralized data storage solution
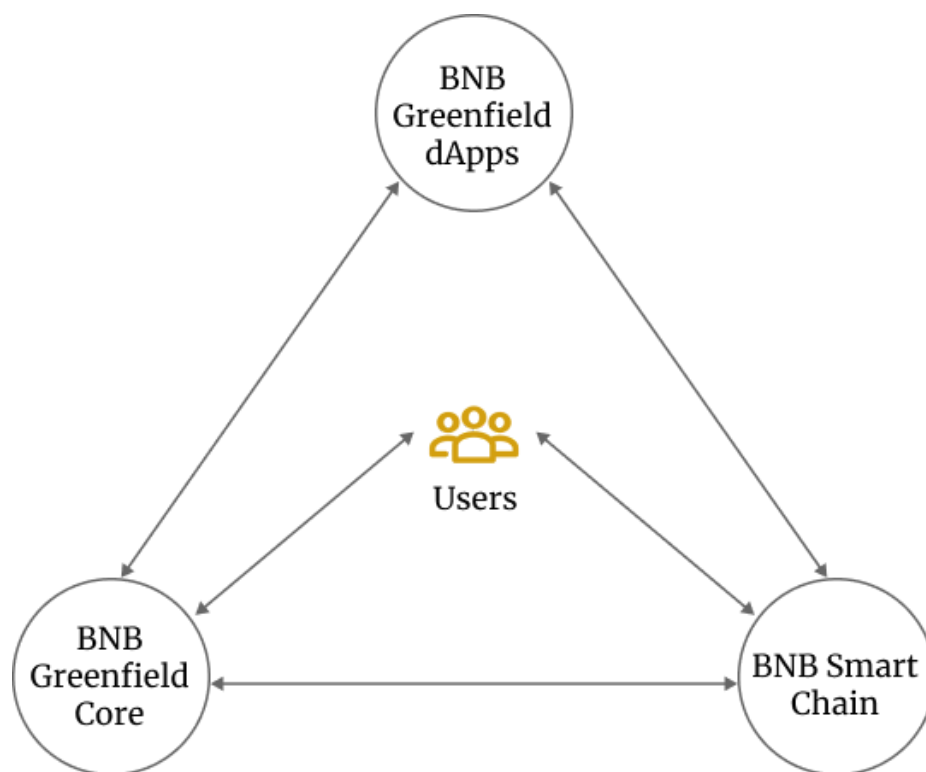

Source: BNB Greenfield whitepaper

Solana

Solana was among those that were relatively heavily impacted by the FTX news from last year and has since bounced back well, as can be observed in their growth numbers, particularly market cap and trading volume. The average transaction fee is the lowest in class, and its staking ratio is also the highest among the group.

- ◆ **Solana Mobile:** Solana made a push toward Web3 hardware and launched **Saga[15], an Android mobile phone that is tightly integrated with the Solana blockchain**. The phone focuses on easy and secure Web3 transactions and the management of digital assets such as tokens and NFTs. They also launched the **Solana Mobile Stack**[16], an open-source software toolkit for building Android applications that can interact with the Solana network.

- ◆ **Firedancer:** Firedancer is a Solana validator client being developed by Jump Crypto and will be **Solana's second, fully independent validator client**[17]. In fact, after launch, Solana would become the only other L1 besides Ethereum to have more than one independent validator client. The benefit of Firedancer is **increased network reliability and resiliency,** i.e., if a bug takes down one of the clients, the network can remain running on the other. Additionally, **Firedancer aims to significantly bolster Solana's scalability** (Firedancer has processed 1M+ TPS in recent tests[18], much more than Solana's current average of 4K) and **reduce latency times**, which should help give Solana DeFi a performance boost.

- ◆ **Token-22:** The Solana team has always focused on programmability, and Token-22 is a direct byproduct of this vision. Token-22 is a new token standard that aims to enable the development of new applications, for example, collecting royalties on transfers and confidential payments. The program is currently under audit[19], with a mainnet expected later this year.

Tron

- ◆ **USDT on Tron:** There has been considerable redistribution in the [stablecoin](#) market through the first half of the year, with liquidity moving from USDC and BUSD to USDT. Given **one of Tron's primary use cases has been to facilitate USDT usage**, Tron has been a major beneficiary of this migration. Tron **started the year with US$31.7B of USDT hosted on it and ended H1 2023 with over US$40.6B**[20] **(up 29%)**. USDT dominance on Tron is now upwards of 92%. The **total stablecoin market cap on Tron also increased from US$33.6B to US$43.9B** in the same period (up 31%).

Figure 14: Tron is the largest source of USDT supply across all blockchains
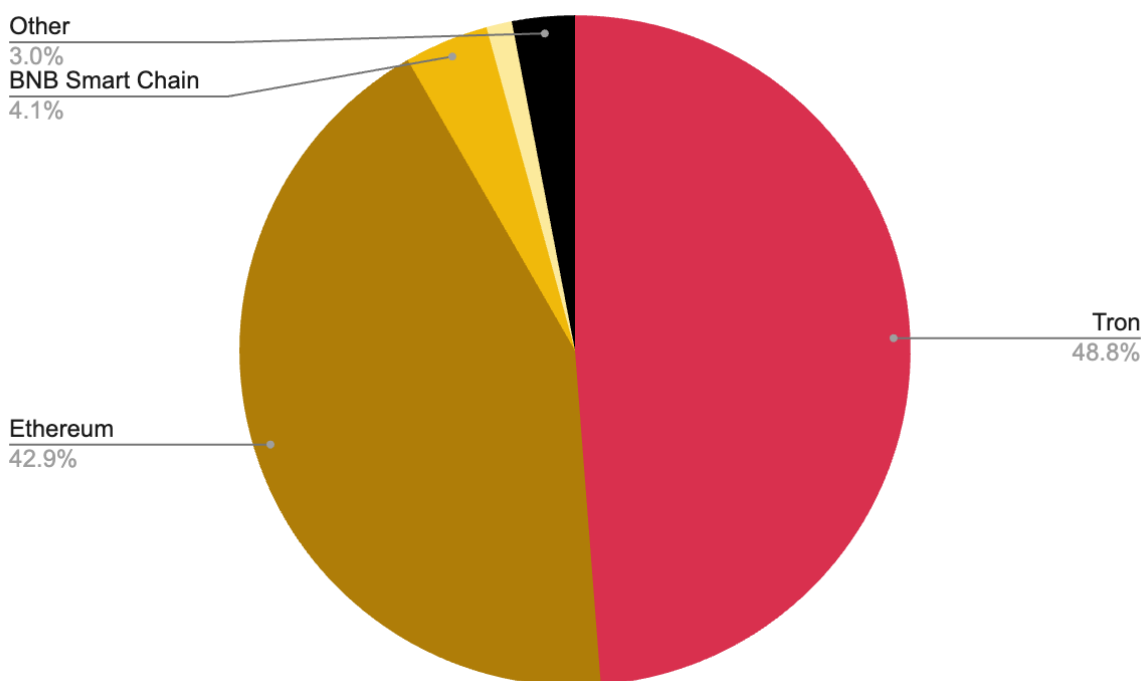
Source: DeFillama, Binance Research, as of July 4, 2023

Polygon PoS

◆ **Polygon 2.0:** The latest announcement to emerge from Polygon has revolved around their vision of creating the "Value Layer of the Internet"[21]. **Polygon 2.0 has been conceptualized as a network of zero-knowledge ("ZK")-powered L2 chains unified via a novel cross-chain coordination protocol.** The aim is to support a virtually unlimited number of chains that can interact securely and instantly, providing limitless scalability and a unified pool of liquidity, similar to our existing internet structure.

The **first step toward this vision is to upgrade the Polygon PoS chain to a zkEVM validium, which has been described as a "first-of-its-kind decentralized L2 secured by ZK proofs"**[22]. Validiums are scaling solutions[23] that leverage ZK proofs to guarantee transaction validity but store transaction data off-chain. This is in contrast to rollups like Polygon zkEVM, which store the data on-chain. Given that the publication of this data is expensive (see Page 8 here) and can limit throughput, validiums can be seen as a lower-cost, higher-throughput cousin of rollups, albeit with slightly higher trust assumptions.

Polygon believes that their upgraded zkEVM validium and the current Polygon zkEVM rollup will complement each other and could potentially focus on different use cases

(more details here). Following a governance process, the team envisions a zkEVM validium launch by the end of Q1 2024.

Figure 15: The first step in the Polygon 2.0 journey is to upgrade the Polygon PoS sidechain to a zkEVM validium
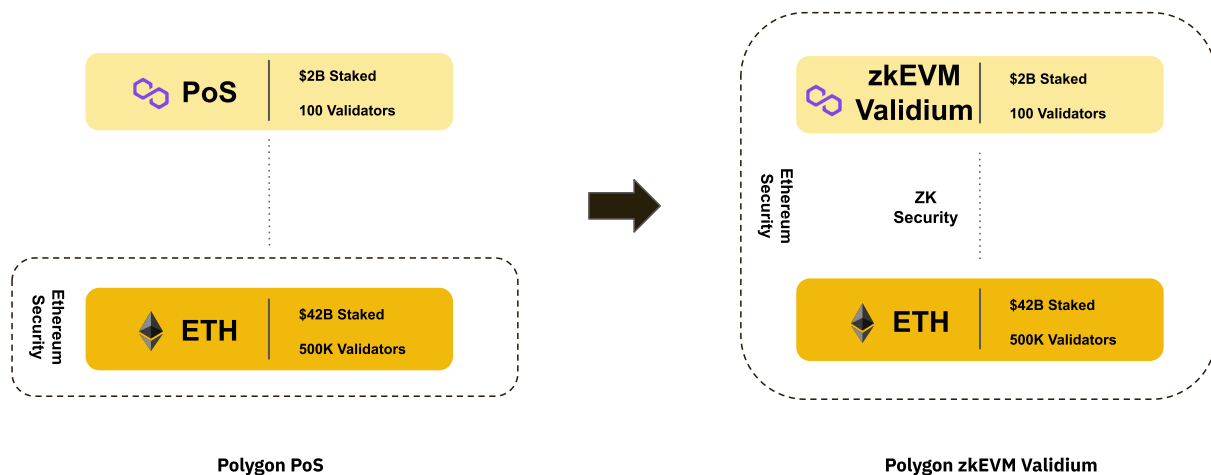
Source: Polygon Blog, Binance Research

The team also recently announced a **proposal for a revamp of the MATIC token**. The token will be called **POL**, and is designed to be an updated version of MATIC to help coordinate the broader Polygon 2.0 ecosystem. **With POL, validators can validate multiple chains across Polygon 2.0, as well as, receive multiple roles and rewards from every chain**. More details in the announcement linked above. If community consensus gathers enough support for this proposal, the team states that the migration from MATIC to POL could start in the next few months.

◆ **Focus on zkEVM:** a large part of Polygon's focus in the last six months (and longer) has revolved around the launch of their zkEVM. The **launch occurred on March 28, 2023**, just a few days after the launch of zkSync's competing product. We will explore this in more detail in the Layer-2 section of this report.

◆ **Partnerships continue:** Polygon's business development work has long been commended across the industry. Through the 2022 bear market, Polygon announced notable partnerships with the likes of Starbucks, Disney, Reddit, and Nike. **Adobe[24], Stripe, Prada, Adidas Originals, eBay, National Geographic[25], and Immutable**[26] have been some of the latest additions to this group. Many of these partnerships have been NFT and gaming-related, although others, like Stripe[27], have to do with payments.

Avalanche

- **Subnet update:** Avalanche Subnets provide the ability to create custom blockchains for different use cases with their own customizable network parameters. The gaming-focused DeFi Kingdoms and Swimmer Network were the first to launch last year, and many others have since launched or are in the process of launching[28]. A new development we would like to highlight here is the launch of **Evergreen Subnets[29], a suite of deployments, customizations, and tooling designed for financial service-related use cases.** Most recently, Avalanche introduced its **latest Evergreen Subnet, "Spruce."** Spruce[30] will be **used as a testnet by TradFi institutions, including T. Rowe Price Associates, Wisdom Tree, Wellington Management, and Cumberland, to evaluate the advantages of executing and settling trades on-chain.**

- **Corporate partnerships:** Avalanche has consistently maintained a focus on corporate partnerships, and in 2022, they announced deals with Shopify, KKR, Alibaba, etc. They have continued this year, announcing strategic partnerships with **Amazon Web Services ("AWS")[31] and Tencent Cloud**[32]. These aim to promote Avalanche's infrastructure and Subnets to enterprises and institutions and enable one-click node deployment for developers interested in running Avalanche nodes.

- **Developer focused news:** Two notable announcements in the last six months are the introduction of **HyperSDK** and **Glacier API**. HyperSDK is a developer framework to build high-performance virtual machines on Avalanche[33]. It aims to be an "out-of-the-box" solution to speed up the development process. Glacier API[34] is an API service that indexes Avalanche Subnets and collects data from both Avalanche and Ethereum networks. It supplies developers with real-time and historical data, which can be utilized for various applications such as wallet services and token transfers.

Cosmos

- **Replicated Security:** One of the key goals of Cosmos' developers and community has been to establish the Cosmos Hub as a central network of economic security (and thereby find meaningful ways to accrue value to the ATOM token). Cosmos took a meaningful step towards realizing this vision through **the launch of their shared security system, Replicated Security.** In a nutshell, "consumer chains" can benefit from the economic security of the Cosmos Hub and its validator set in exchange for fees. This helps newer and smaller chains bypass the need to bootstrap their own validator set, which is a costly and time-consuming process (and even then, they might not be able to match the security of the Cosmos Hub).

"In a nutshell, "consumer chains" can benefit from the economic security of the Cosmos Hub and its validator set in exchange for fees. This helps newer and smaller chains bypass the need to bootstrap their own validator set, which is a costly and time-consuming process..."

Neutron, a general-purpose, permissionless smart contract platform, became the **first project to launch as a consumer chain** on May 11, 2023[35]. **Liquid staking protocol Stride looks to be the next in line**, with a proposal to onboard the chain having recently passed[36]. It is interesting to see how the Cosmos Hub is utilizing the strength of its economic security to create deeper relationships within Cosmos appchains and simultaneously accrue value towards the ATOM token.

To learn more about Cosmos' Replicated Security and the types of models other chains are using to compete, check out our recent report, [Modular Blockchains: The Race to Become the Top Security Provider](#).

◆ **Mesh Security:** Another shared security model that is currently in the works in the Cosmos ecosystem is Mesh Security. **Osmosis, a notable Cosmos appchain, is the project behind this model**, and it is working alongside others in the ecosystem, e.g., Axelar, the Akash Network, etc. Rather than a hub-and-spoke model, as with Replicated Security, Mesh Security essentially allows for bilateral and multilateral sharing of economic security between many different appchains. **Those that have staked tokens on one Cosmos appchain can restake those on another partner chain, thereby sharing security between appchains.**

Mesh Security **targets appchains that are looking to augment their current level of economic security** rather than those that are looking to bootstrap an entire validator set (who might be better off using Replicated Security). **Many appchains already have significant validator overlap and thus already share some level of economic dependency; utilizing Mesh Security is a natural next step to further strengthening these relationships**. Mesh Security is still in development, with the initial announcement coming in May 2023[37].

Figure 16: While Replicated Security uses a hub-and-spoke, unilateral security model, Mesh Security is more focused on bilateral or multilateral security
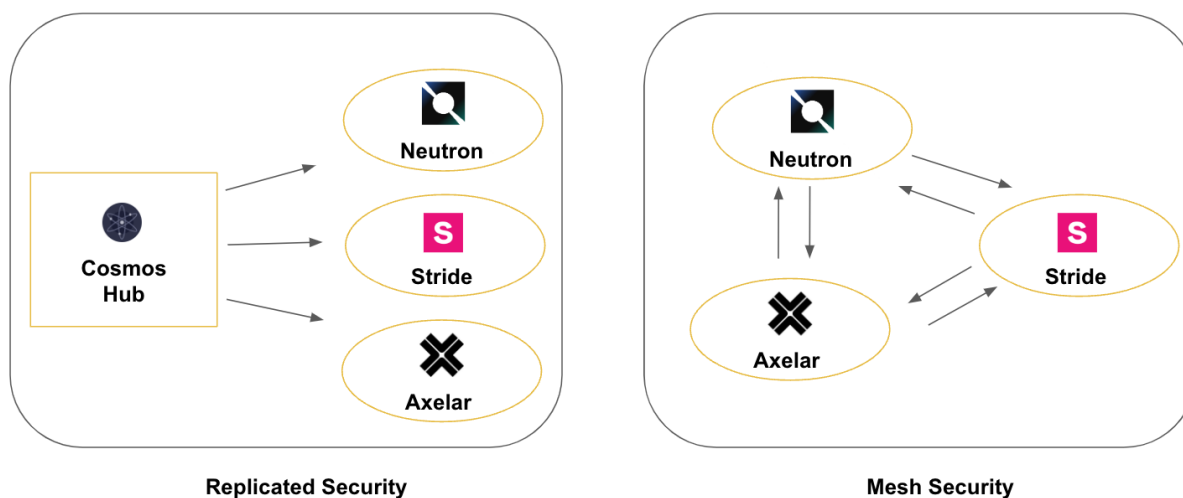
Source: Binance Research

- ◆ **Upcoming dYdX Chain mainnet:** A major news story from last year arose when leading derivatives exchange dYdX announced[38] that for their next iteration, i.e., dYdX v4, they will be moving from their current Ethereum-based StarkEx L2 solution to their own standalone Cosmos blockchain. Given dYdX's strong position in the DeFi landscape and derivatives market, this development was quite notable and considered a big win for the Cosmos ecosystem. Most recently, after completing four of their five milestones, dYdX launched the public testnet of their new chain on July 5, 2023[39]. It will be interesting to see how this is received and if other major projects choose to migrate to their own Cosmos chains following dYdX v4's mainnet launch.

Others

We have covered some of the leading L1 solutions in this section and provided an update on their major developments from the last six months. Naturally, there are many other L1s who we have not covered in this section, but it should go without saying that they have also been working tirelessly and shipping updates consistently over the first half of the year. **Cardano** continues to develop and after launching their Hydra L2 scaling solution in May, recently unveiled plans for an **upcoming decentralized payment service called Hydra Pay[40]**. Fantom announced the **Fantom Virtual Machine**, showing promising early results in simulations[41]. **Sui** launched[42] their mainnet, joining Aptos in being the two biggest blockchains using the Move programming language. Overall, the L1 space continues to grow and innovate day-by-day and remains one of the most exciting sub-sectors within crypto.

The Layer-2 ("L2") World

4.1 Overview

The L2 narrative has experienced multiple strong points over the last year. While we did not quite see the long anticipated "L2 Summer" in 2022, it seems the **L2 boom instead started to show itself through the end of the year and has been touching new heights in 2023**. Focusing in on Ethereum's L2 scaling solutions, a number of high-quality projects are now fully functioning and handling millions of transactions off the base L1 chain. **While optimistic rollups saw the first initial wave of adoption and still command the lion's share of the market, ZK solutions have been catching up fast, particularly with the launch of numerous zkEVMs in the last few months**. Ethereum's L2 solutions are now at the stage where they are exploring the next stage of their evolution and have started to shift focus towards L3s, Superchains, Hyperchains, and more. In this section, we provide an overview of the L2 market (primarily focusing on Ethereum), examine top solutions from both the optimistic and ZK families, and explore upcoming developments.

Figure 17: Optimistic rollups remain in the lead from a market share perspective

Logo	Name	Rollup type	Market Share	Max Daily TPS	TVL (US$M)	Cost to send ETH (US$)	Cost to swap tokens (US$)
	Arbitrum One	Optimistic	60.04%	31.64 *(Mar 2023)*	5,690	0.15	0.40
	OP Mainnet	Optimistic	22.41%	9.26 *(Jan 2023)*	2,130	0.10	0.21
	zkSync Era	Zero Knowledge	7.45%	12.00 *(May 2023)*	676	0.19	0.68
	Loopring	Zero Knowledge	1.03%	1.48 *(July 2022)*	96	0.03	0.48
	zkSync Lite	Zero Knowledge	0.84%	3.29 *(Mar 2023)*	80	0.12	0.29

	StarkNet	Zero Knowledge	0.74%	3.05 *(May 2023)*	70	0.50	1.25
	Polygon zkEVM	Zero Knowledge	0.49%	0.82 *(June 2023)*	47	0.10	1.36
	Boba Network	Optimistic	0.10%	0.29 *(Nov 2021)*	9	0.16	0.26
	Ethereum	Base Layer	n/a	22.37 *(Dec 2022)*	n/a	1.93	9.64

Source: l2beat.com, l2fees.info, Binance Research, as of July 5, 2023

As we can see above, **optimistic rollups lead from a market share perspective and have also recorded some of the highest daily TPS among all solutions**. Additionally, they maintain relatively low costs for sending ETH, although this is largely similar across all solutions. The cost to swap tokens is more varied, with OP Mainnet, zkSync Lite, and Boba Network costing relatively little, while others like StarkNet and Polygon zkEVM are on the higher side.

We can also consider the **L2 scaling factor**, a term coined by l2beat.com. The **scaling factor is a metric describing how many more transactions are settled on Ethereum, taking L2 solutions into account**. The exact formula is (L2 transactions + ETH transactions) / ETH transactions. **For the last seven days (as of July 6, 2023), this number is 4.19x, i.e., 4.19x more transactions have settled on Ethereum than would have been possible without L2 solutions**. Looking at Figure 17, we can see a visual representation of this. L2 average TPS overtook the Ethereum average TPS late last year, i.e., L2 solutions have been able to handle higher TPS compared to Ethereum, and this number has consistently increased since then. **As of the time of writing this report, the L2 average TPS is 37.6, whereas Ethereum's average TPS is 12.6**[43].

Figure 18: Since L2 average TPS first took over Ethereum average TPS in October 2022, it has continuously increased its lead
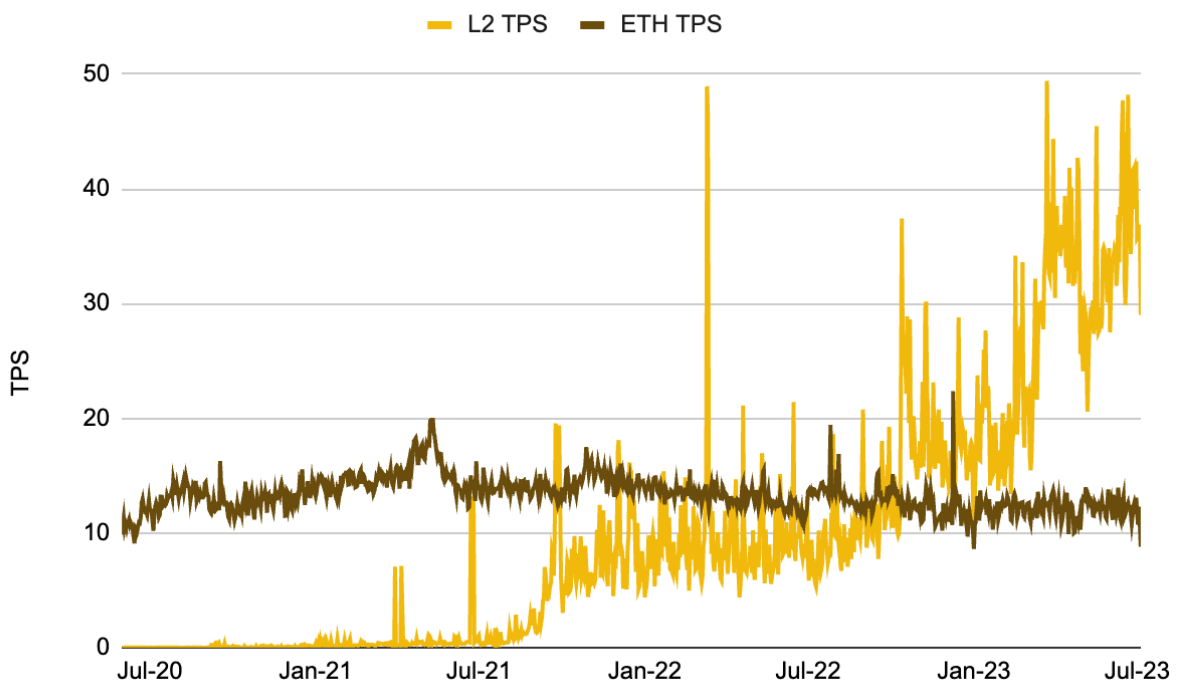
Source: l2beat.com, Binance Research, as of July 6, 2023

Remember, **L2 rollups, of both the ZK and optimistic variety, work by performing transaction execution outside of the L2 and then posting this data up to the L1**, where consensus and settlement occur (check out our recent report to learn more about this process). The **act of posting transaction data up to the Ethereum L1 incurs a cost, which we can refer to as publishing fees**. As we can see below in Figure 19, L2 rollups are routinely on the list of the top gas spenders on Ethereum. **Not only does this further describe the importance and daily relevance of L2 solutions, but it also illustrates the significant value accrual that Ethereum has been able to attain through these solutions**. In essence, these execution-focused rollups are secured by Etheruem security (where Ethereum functions as the consensus, data availability, and settlement layer) and pay fees for this privilege. We can see below how these fees have become a major revenue source for Ethereum.

**Figure 19: Three out of the top five Ethereum gas users are L2 solutions**

Logo	Protocol	Market Sector	Gas Used Last 90 Days (US$M)
	Uniswap	DEX	239.2

	Tether	Stablecoin	31.5
	zkSync	L2	21.2
	Arbitrum	L2	18.6
	Metamask	Wallet	17.3

Source: Token Terminal, Binance Research, as of July 6, 2023

In fact, these **publishing fees have been rising through this year and reached an all-time high in May.** This was contributed to by rising transaction costs on the Ethereum L1 partially due to a renewed interest in meme coins, but also due to the consistent and strong usage of L2s for transaction execution.

Figure 20: Ethereum L2 mainnet publishing fees in May were over five times higher than in January
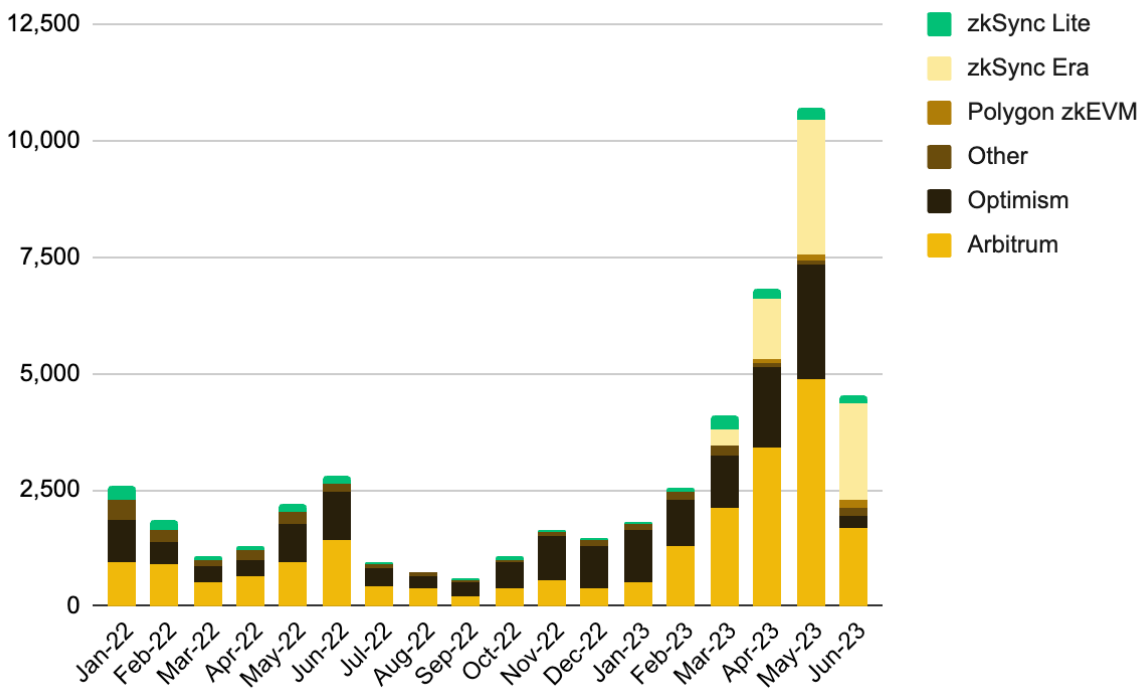
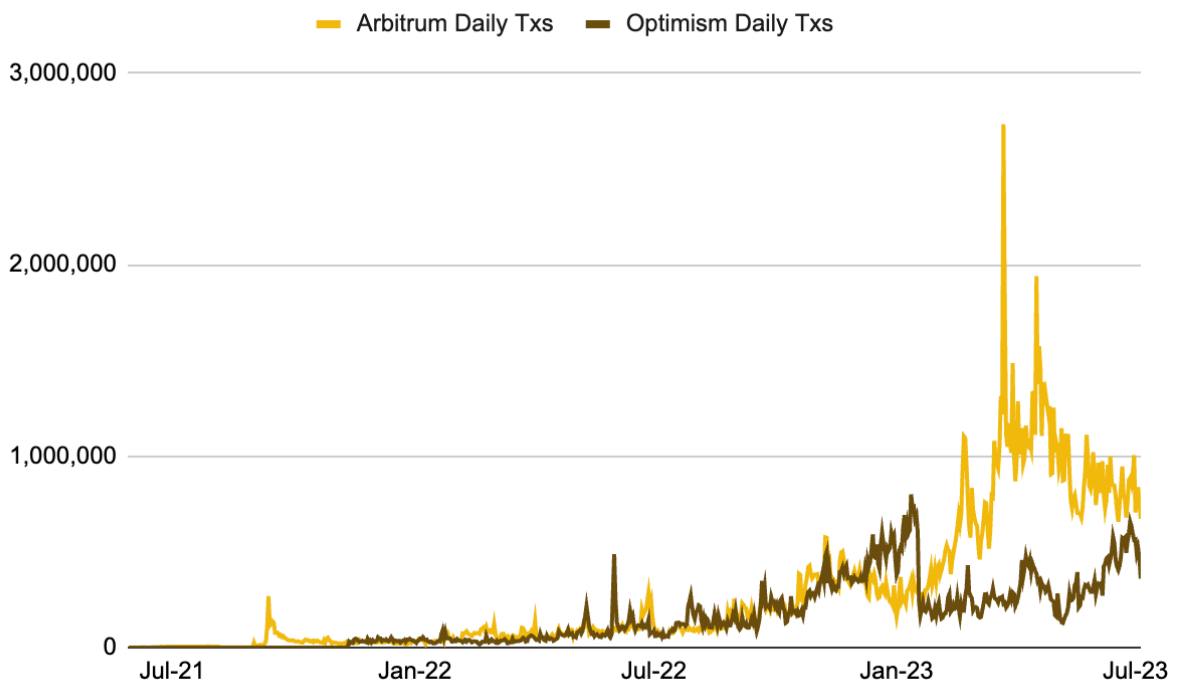Source: The Block Data, Binance Research, as of June 30, 2023

Optimistic Landscape

Arbitrum

- **Performance:** Arbitrum has had a successful start to the year, ending H1 2023 holding the majority market share (over 60%) among all Ethereum rollups. Correspondingly, it is also one of the primary fee-payers and Ethereum L1 gas users, maintaining a strong position in the ecosystem. While there were days at the start of the year when Optimism was ahead in terms of daily transactions, Arbitrum has pulled ahead for the majority of the last six months. **Arbitrum ended H1 2023 with nearly 145M[44] transactions, compared to just under 60M for Optimism[45]. In terms of unique addresses, Arbitrum boasts 9.6M, while Optimism has around 6.2M.** Although both optimistic rollups have been somewhat neck-and-neck over the last year or so, Arbitrum has made some big strides in the last six months, and the numbers show it.

Figure 21: Arbitrum has gained a sizeable lead over Optimism in terms of daily transactions, although Optimism is slowly creeping back up


Source: Block explorers, Binance Research, as of July 6, 2023

- **ARB token:** The ARB token airdrop was one of the major events for Arbitrum in the first half of this year, occurring on March 23, 2023. **With price stabilizing around**

the US\$1.1–1.4 mark, the token currently has a market cap of roughly US\$1.4B, giving it the highest valuation of any L2 token (not counting Polygon's MATIC, which is not included in the traditional L2 token definition due to its primary usage being related to the Polygon PoS sidechain). **Over 42% of the initial supply is being held by the Arbitrum DAO Treasury to at least partially be used for incentivizing projects and developers building on top of Arbitrum.** Around 13% has already been airdropped, while the bulk of the remainder is for the team and investors.

Figure 22: ARB token distribution

● DAO Treasury ● Offchain Labs Team ● Investors ● Airdrop ● DAOs building on Aribtrum
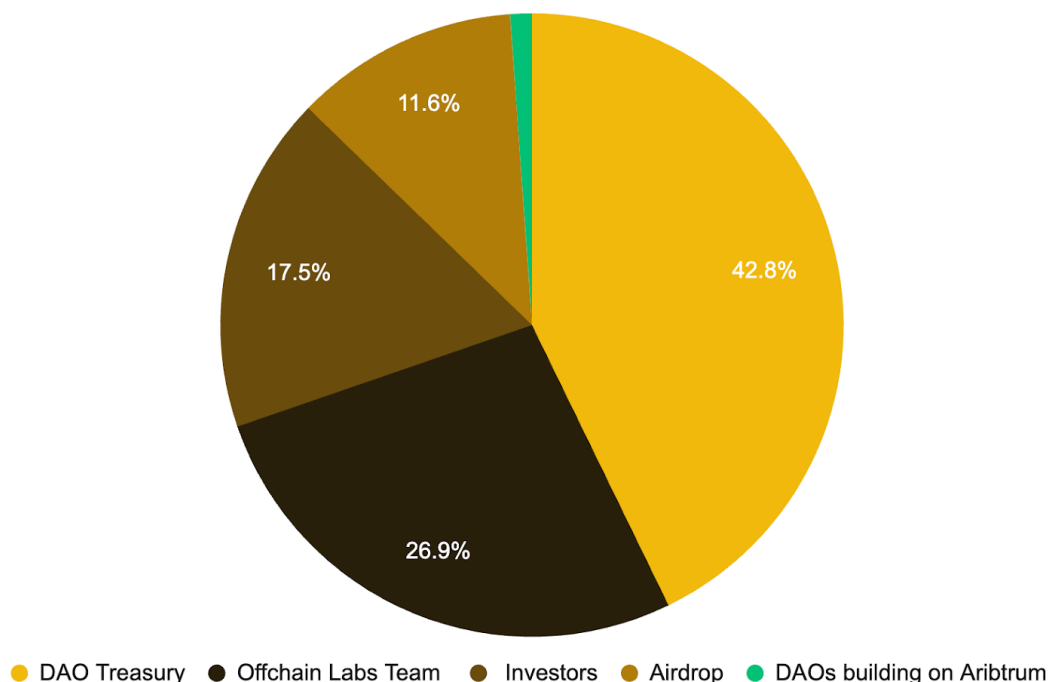
Source: Arbitrum documentation, Binance Research

◆ **Arbitrum Orbit:** Orbit is the latest offering from Arbitrum and forms their vision for the next evolution of rollups. **Arbitrum Orbit allows developers to create their own dedicated L3 chains that settle on one of Arbitrum's L2 chains**. Orbit is the permissionless development framework that provides the infrastructure for developers to create these chains. These chains can be designed to be **highly customizable, with Arbitrum documentation even referring to them as "tailored chains"[46], aiming to optimize for precise use cases and business needs.** This is an exciting new development, and we look forward to seeing what sort of projects decide to build their L3 on top of Arbitrum.

Figure 23: A visual representation of what Arbitrum Orbit aims to let developers build
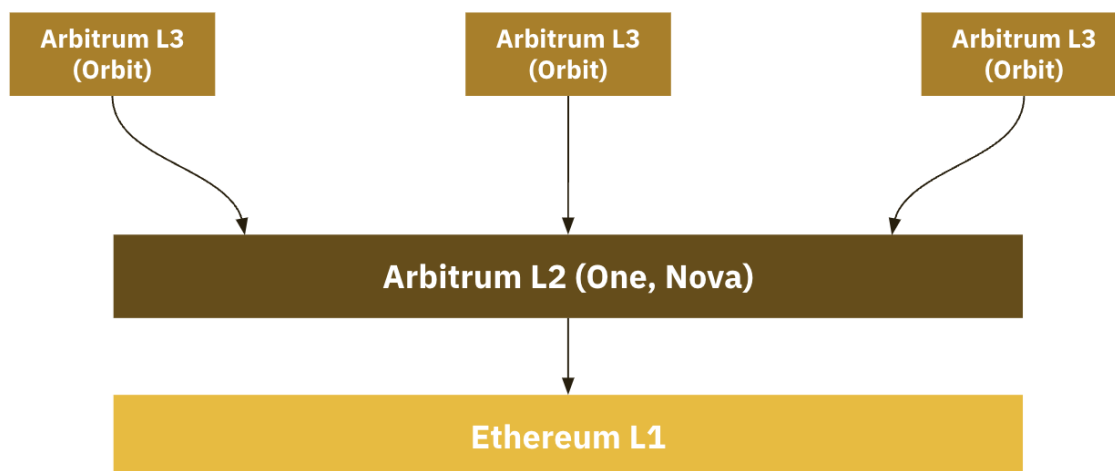

Source: Arbitrum documentation, Binance Research

OP Mainnet

- ◆ **Performance:** OP Mainnet is also a leading L2 rollup and has been a mainstay of the Ethereum scaling landscape since it went to mainnet in December 2021. While Arbitrum is currently ahead in terms of market share and a few other metrics, OP Mainnet has also topped various leaderboards in the last year and still maintains a significant lead ahead of other competitors. One notable aspect is the **extremely low transaction fees on OP Mainnet**; as Figure 17 shows, **OP Mainnet is currently the cheapest L2 to swap tokens on**. There has been a sizable decrease in fees recently owing to Optimism's (the company behind OP Mainnet) recent Bedrock upgrade. Due to the optimized data compression strategy implemented in Bedrock **fees are now roughly 74% cheaper[47] per transaction on average** than before the upgrade.

Figure 24: Average OP Mainnet gas fees are significantly lower on average after the Bedrock upgrade
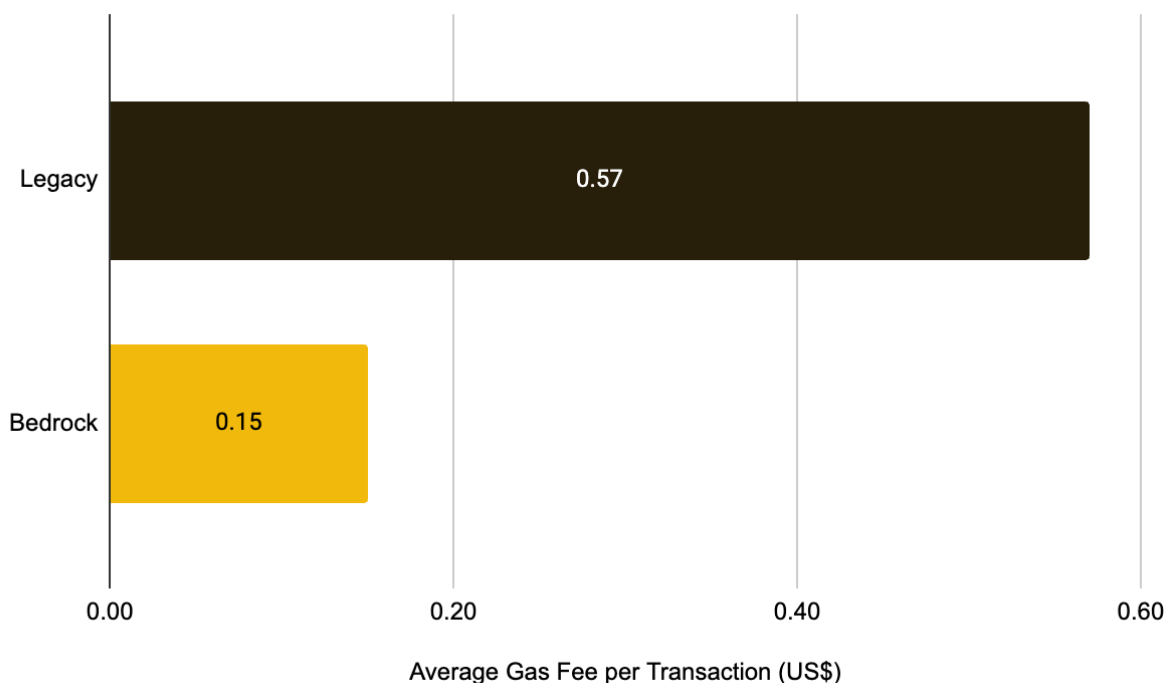
Source: Dune Analytics (@oplabspbc), Binance Research, as of July 7, 2023

- ◆ **OP Stack:** Introduced in October 2022, the OP Stack has been described as a "modular, open-source blueprint for highly scalable, highly interoperable blockchains of all kinds"[48]. It is the **standardized, shared, and open-source development stack that powers OP Mainnet and can be used to create a network of interoperable and coordinated L2 chains**. We can think of it as a "build-an-L2" supermarket. There are a number of different layers in the stack; please check out our recent report on the subject to dig deep into each individual layer.

  The OP Stack deconstructs all of the different components that go into building an L2 and packages them as separate modules. Developers can then modify existing modules or create new ones to tailor them to their specific needs. OP Mainnet is the first chain built with the OP Stack. **Coinbase's upcoming Base L2[49] is also built using the OP Stack, as are others such as Aevo (a decentralized options exchange) and Zora (a decentralized NFT marketplace). BNB Chain's opBNB is also based on the OP Stack.** This lines up well with the Optimism team's vision of an incoming explosion of highly compatible L2s and L3s, and it will be interesting to see who is next to build using the OP Stack.

- ◆ **Superchain thesis:** Optimism's Superchain is envisioned as a **decentralized network of L2 chains (called OP Chains) that share security, a communication**

layer, and an open-source technology stack (the OP Stack). These chains will be standardized and intended to be used as interchangeable resources. This standardization will enable builders to create applications that target the Superchain as a whole rather than just the underlying chain the app runs on. It is important to note that the **Superchain is currently just a concept and a work in progress.** In fact, the Optimism team believes it to be a "multi-year (if not decade) journey"[(50)]. **OP Mainnet is the first chain in the Superchain, and Base will be the second member (the mainnet is expected later this year).**

Figure 25: Visual representation of the Superchain
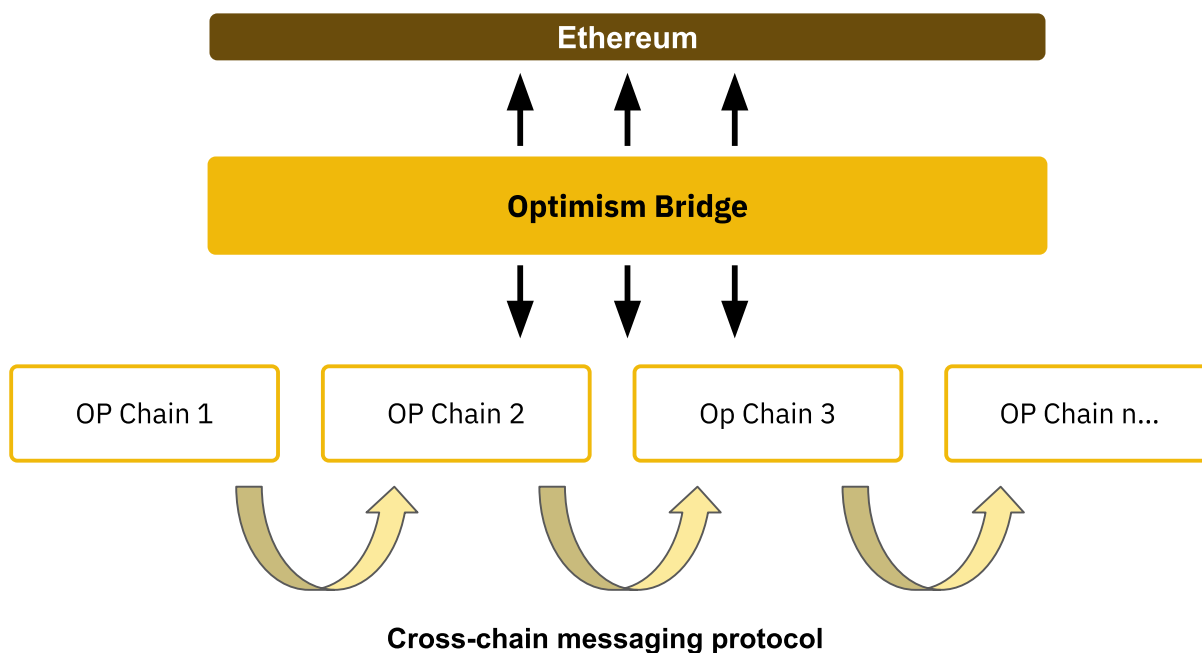
Source: Optimism website, Binance Research

4.3 Zero-Knowledge ("ZK") Landscape

zkEVM Discussion

ZK-rollups are the other primary Ethereum scalability solutions, and as we saw in Figure 17, they also command a respectable chunk of the market outside of Arbitrum and Optimism. Previously, **one of the main drawbacks of ZK-rollups was their lack of support for the Ethereum Virtual Machine ("EVM")** and, hence, their inability to execute related smart contracts. **This has changed with the development of zero-knowledge Ethereum Virtual Machines ("zkEVMs"), which has propelled the ZK landscape to new heights.** zkEVMs are special types of ZK-rollups that allow smart contracts to be easily deployed and

executed on the EVM with limited code changes. For developers, the key benefit is that they can port EVM-compatible dApps over to zkEVMs and realize much lower gas fees and higher transaction throughput while also benefiting from Ethereum's security and decentralization. Launching a zkEVM has been the primary focus of the major ZK-rollup companies over the last year, and we have seen a number of mainnet and testnet launches in H1 2023.

> *"zkEVMs are special types of ZK-rollups that allow smart contracts to be easily deployed and executed on the EVM with limited code changes. For developers, the key benefit is that they can port EVM-compatible dApps over to zkEVMs and realize much lower gas fees and higher transaction throughput while also benefiting from Ethereum's security and decentralization."*

Before looking more closely at the leading ZK projects, a quick word on zkEVM taxonomy. For this, we reference Vitalik Buterin's article on the different types of zkEVMs. **Vitalik classifies different zkEVMs by their "type", largely based upon their compatibility with Ethereum.** While being of a certain type does not necessarily mean that a project will be more or less successful, it does tell us about the trade-offs that projects are making and how that relates to performance and Ethereum compatibility.

Figure 26: Type categorizations of various zkEVM projects with their compatibility and performance trade-offs

zkEVM	Type	Mainnet Launch Date
TAIKO	Type-1	TBC
polygon zkEVM	Type-2	Q1 2023
Scroll	Type-2	Q2 2023
Linea	Type-2	TBC
era	Type-4	Q1 2023
STARKNET	Type-4	Q4 2021

Type-1: fully Ethereum-equivalent. They do not change any part of the Ethereum system and allow rollups to re-use a lot of infrastructure.

Type-2: exactly EVM-equivalent, but not quite Ethereum-equivalent due to minor modifications made to make development easier.

Type-3: almost EVM-equivalent. Removes a features that are tedious to implement and instead uses precompiled contracts.

Type-4: works by compiling high-level language smart contract source code to a language that is ZK-SNARK-friendly.

Source: Vitalik Buterin, Project teams

zkSync

- **zkSync Lite: zkSync Lite (previously known as zkSync 1.0) was a first-stage ZK-rollup scaling solution released by Matter Labs in June 2020**. It offered an early version of the network and was intended to facilitate basic payment solutions such as swaps and transfers swiftly at a low cost. However, it faced limitations given the lack of smart contracts to support functions outside of these activities, which led to zkSync Era. **Despite these limitations and the fact that the next generation of zkSync Era is now live, zkSync Lite is still a top 10 Ethereum L2 and holds over US$80M in TVL**[51].

- **zkSync Era:** zkSync Era was a significant upgrade from zkSync Lite and was first deployed to a private testnet in December 2021 before its public launch on March 24, 2023. It **represented the first zkEVM to hit mainnet** and offered smart contract support for EVM dApps to build on the network. **Performance since launch has been strong, and TVL has surpassed US$670M, with over 1M unique deposit addresses**. For the first time ever, as we saw in Figure 20, **zkSync Era surpassed Optimism and was the second-largest fee payer to Ethereum in terms of data publishing fees (in May)**. Considering Optimism's consistently strong position in the market, this is a great indication of the level of interest that zkSync Era has been able to garner in the last few months.

Figure 27: zkSync Era saw 88.9% MoM TVL growth in May
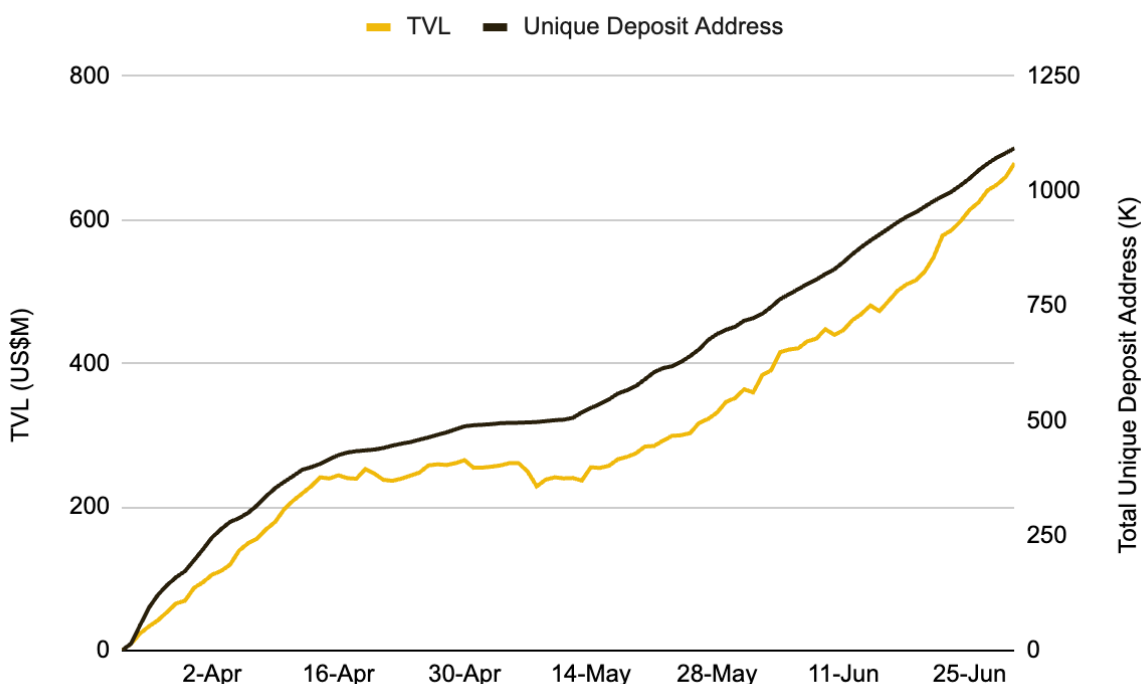
Source: Dune Analytics (@makaineko), Binance Research, as of June 30, 2023

- **Hyperchains and the ZK Stack:** Matter Labs' vision for the next evolution of their product revolves around the ZK Stack and Hyperchains. In late June, they introduced the **ZK Stack, described as a "modular framework for building sovereign ZK-powered chains."**[52] It is a free, open-source framework to build **custom ZK-powered L2s and L3s, which they refer to as "Hyperchains."** The goal is to create an ecosystem of seamlessly interoperable and sovereign chains that rely on Ethereum for liveness and security, while Hyperbridges facilitate interconnectivity between them. zkSync Era is designated as the pioneering Hyperchain. Matter Labs also draws attention to the concept of **hyperscalability** and their vision of an **unfragmented and unified liquidity network**. It will be important to stay close and see which projects decide to build a L2 or L3 Hyperchain, and especially **how this solution fares against Optimism's OP Chains or Arbitrum's Orbit L3s.**

To learn more about zkSync, their wider product suite, and how they compare to competitors, check out our recent report, [The zkEVM World: An Overview of zkSync](#).
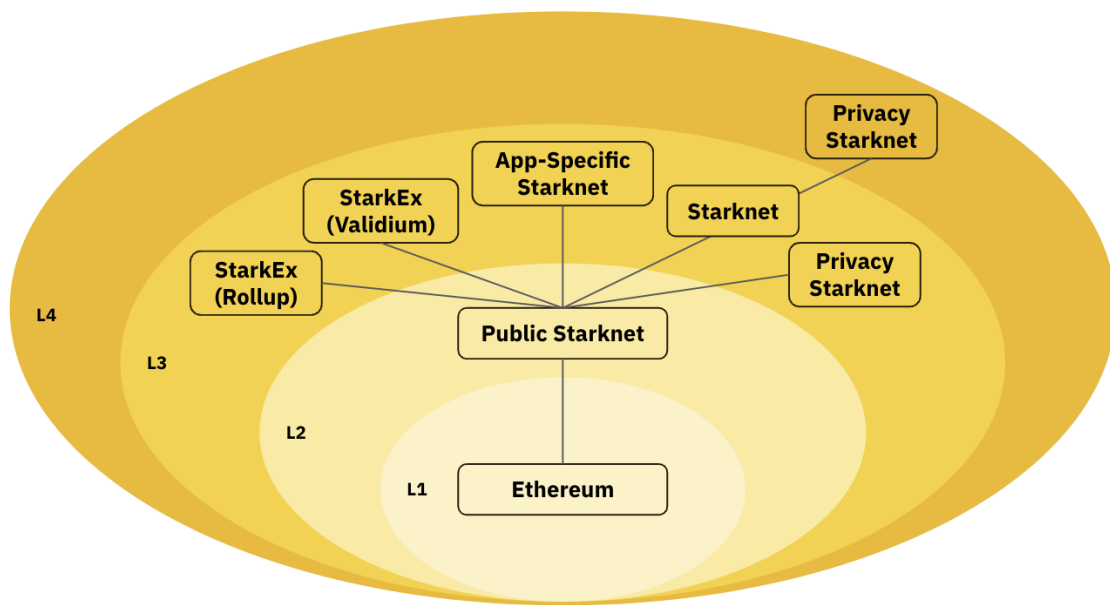
StarkNet

- **zkEVM:** StarkWare's **StarkNet is a general-purpose ZK-rollup chain that utilizes its proprietary Cairo language rather than Ethereum's Solidity**. This has meant that StarkNet runs its own custom smart contract virtual machine, Cairo VM, and that StarkNet does not have direct EVM compatibility, which is a hurdle that some of its competitors do not have to contend with. However, we should note that a company called **Nethermind has been working on a Solidity to Cairo transpiler, dubbed Warp**[53]**, which will mean StarkNet will eventually become a de facto Type-4 zkEVM.**

  Another interesting development in the StarkNet zkEVM story is the upcoming project, Kakarot. **Kakarot is an Ethereum-compatible zkEVM solution developed using the Cairo language.** The project closed its pre-seed funding round[54] on June 2, 2023, with investors including Vitalik Buterin. It is expected to **launch its testnet in August, with the ultimate goal of enabling a Type-1 zkEVM**, as outlined[55] in Phase 3 of its roadmap.

- **Fractal scaling:** StarkWare was arguably the first major organization to start the discussion around multi-layer architecture, having published their blog post, [Fractal Scaling: from L2 to L3](#), all the way back in December 2021. **StarkWare's multi-layer network thesis suggests that while L2s' function is for general-purpose scaling, L3s should be leveraged for customized scaling**. This is certainly not dissimilar to what other L2s have proposed, and it's quite plausible that StarkWare initially inspired these other projects with their early foray into the subject.

Slush has taken the fractal scaling idea further and has been working on an SDK for building zkVM L3s on top of Starknet. While the exact details of the project are extremely technical and fall beyond the scope of this report, it is worth keeping a close eye on how Slush progresses with their roadmap[56] and what sort of players they can attract to their zkVM L3 universe.

Figure 28: Visual representation of StarkWare's initially proposed multi-layer architecture framework

Source: StarkWare Blog, Binance Research

◆ **Quantum Leap:** StarkNet's most recent major upgrade, dubbed "Quantum Leap[57]" was deployed on its testnet on July 5, 2023, with the mainnet occuring launch a week later. The upgrade **aims to increase the TPS of the blockchain to at least 100 and reduce the time to confirm and include a transaction (time-to-inclusion).** Given that StarkNet's max daily TPS was recorded at 3.05 (as in Figure 17) and is around 2.51 as of the time of writing[58], reaching 100 TPS would be a significant improvement and outshine its other major competitors. This improvement is part of a series of scheduled upgrades planned for Q3 and Q4 of 2023.

Polygon zkEVM

◆ **Performance:** Polygon zkEVM is a ZK-rollup solution that originated from Polygon's prior work exploring Ethereum scaling through their acquisitions of ZK projects Hermez and Mir. Launched just a few days after zkSync Era on March 28, 2023, Polygon zkEVM has also attracted a fair degree of attention. **As of June 30, TVL was upwards of US$40M[59], and the number of unique addresses was over 192K[60].**

Figure 29: Polygon zkEVM saw 78.8% MoM TVL growth in June
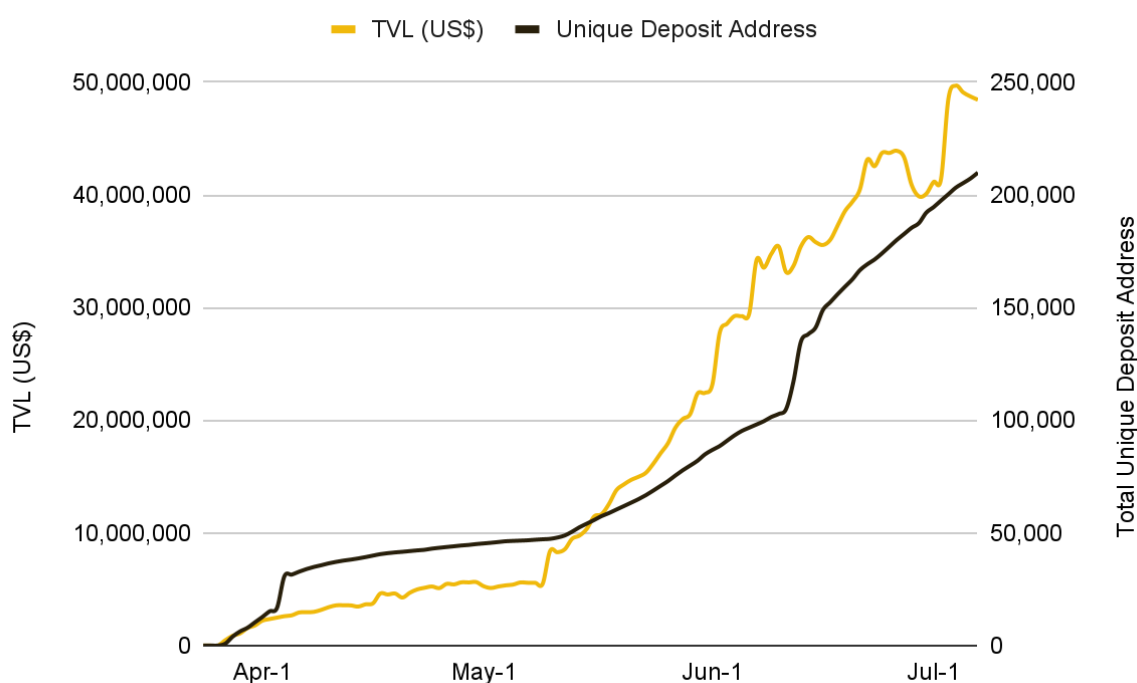
Source: Dune Analytics (@Marcov), Polygon Explorer, Binance Research, as of June 30, 2023

◆ **Polygon 2.0 discussion:** As we outlined in the Polygon PoS section, the latest announcement to emerge from the team has been Polygon 2.0. The goal is to **create a network of ZK-powered L2 chains that are unified by a novel cross-chain coordination protocol**. The first step towards this vision is to upgrade the Polygon PoS sidechain to a zkEVM validium. We discuss the specifics of validiums in more detail in the Polygon PoS section. The question becomes, with their sidechain upgrading to a zkEVM validium, where does that leave the Polygon zkEVM solution? The **Polygon team has clarified that both chains will remain public networks after the upgrade, with both using the latest zkEVM technology, one as a rollup and the other as a validium**.

The Polygon team believes the **two networks will complement each other**. More specifically:

- ○ **Polygon zkEVM:** The **highest level of security**, with a tradeoff of slightly elevated fees and limited throughput. **Best used for high-value applications where security is of the highest priority**, i.e., DeFi.

- ○ **Upgraded Polygon PoS (zkEVM validium):** **Very high scalability and low fees, with a tradeoff of slightly more limited security** compared to Polygon

zkEVM. Best used for **applications requiring high transaction volumes and low transaction fees**, i.e., gaming and social applications.

Assuming the preliminary proposal for the upgrade gathers support, it will go to a formal governance proposal and then be discussed on governance calls and other forums. If consensus is reached, the **Polygon team envisions a zkEVM validium mainnet launch by the end of Q1 2024.**

Figure 30: A visual representation of Polygon zkEVM and the upcoming zkEVM validium
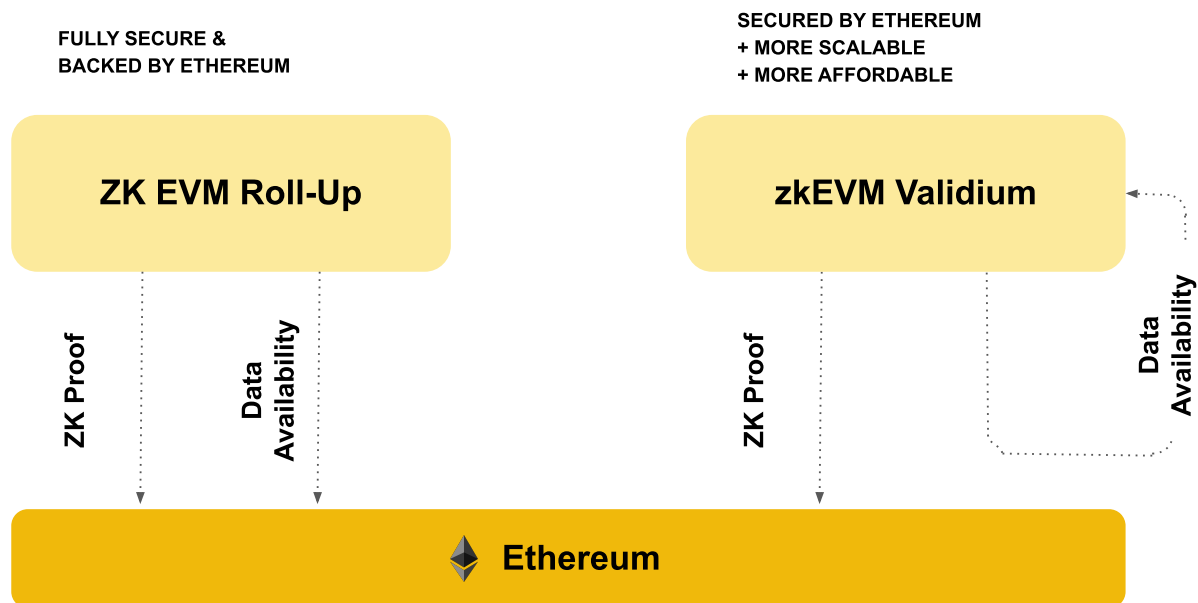
Source: Polygon Blog, Binance Research

Upcoming Launches

◆ **Linea:** Linea is a **type-2 zkEVM solution by Consensys**, the team behind Metamask. After a successful testnet period which saw 5.5M unique wallets commit over 46M transactions, Linea **started rolling out its mainnet alpha release[61]** on July 11, 2023. They are currently starting to onboard launch partners and will aim for a full release during the EthCC event from July 17-20, 2023. . To stress test the network and increase user engagement, **Linea launched Linea Voyage in May**, which consists of weekly challenges over nine weeks. This is somewhat similar to the approach taken by other L2 networks, such as Arbitrum Odyssey and Optimism Quests. Linea will look to launch with a growing ecosystem of over 100 partners, including deep integrations with their sister company, MetaMask.

◆ **Scroll:** Scroll is a **type-2 zkEVM** solution designed to leverage EVM compatibility. It **transitioned to the Alpha Testnet in February 2023**, and the **mainnet launch is estimated to be some time in Q3**. In line with Ethereum's ethos of decentralization,

Scroll also has plans to embark on decentralizing the prover network and its sequencers post-mainnet launch. It also aims to become fully Ethereum-equivalent, i.e., type-1, in the long term. The [ecosystem](#) is also rapidly expanding, with **more than 120 dApps on the network**.

- ◆ **Taiko:** Taiko is a **type 1 zkEVM rollup**, which means that it would be **fully Ethereum-equivalent**, allowing for maximum compatibility and a seamless developer experience. While Taiko is a relatively new player, having only come onto the scene in 2022, the co-founders have extensive experience in ZK-technology, having created Looping, the first ZK-rollup on Ethereum, in 2017. Notably, the **team recently announced a US$22M raise and also launched its Alpha-3 testnet in June**[62]. The **mainnet launch is estimated to be in early 2024**.

(4.4) The L3 Future

As we have highlighted in the individual sections for many of the L2 scaling solutions above, the next emerging trend in scalability is the development of **L3 networks, Superchains, and Hyperchains**. These changes **aim to streamline the L2 development process, bolster security, and unify liquidity, all while fostering increased interoperability** within the broader scalability ecosystem. Whether this leads to a proliferation of application-based rollups or a few notable winners, it will be interesting to follow this narrative closely.

To **learn more** about these developments and become an expert in this new narrative, check out our recent report, [The Layer-2 Evolution: Superchains, L3s, and More](#).

5 Stablecoins

As broader crypto and DeFi markets mature, the first half of this year has brought interesting developments within the stablecoin sector. These include **shifts in the composition of market participants, variations in consumer adoption trends, changes in regulatory landscapes, and evolutions in the strategic approach of protocols**, among other factors. Notably, regulation remains a prominent theme and is largely welcomed, given its significance in fostering further stablecoin adoption. As we move forward in this section, these trends and their implications for the stablecoin sector will be the focus of our exploration.

The stablecoin market has seen a noticeable contraction in size this year. Much of this reduction can be attributed to the shifting regulatory landscape, the discontinuation of Binance USD ("BUSD")[63], disruptions to banking networks relevant to the crypto ecosystem[64], and the residual effects from last year's events involving certain centralized finance ("CeFi") institutions. **Yet, despite a modest decline of 7.0% YTD, the overall strength of the stablecoin sector remains relatively intact, standing at a total market cap of US\$128.1B**[65]. Indeed, as disclosed by a recent study, a strong stablecoin market is widely considered to be imperative for the recovery of cryptocurrency prices[66]. With a contribution exceeding 10% to global cryptocurrency markets[67], stablecoins continue to play a fundamental role as the bridge between the world of TradFi and cryptocurrency.

Figure 31: The global stablecoin market has been on a downwards trajectory in 2023

Source: DeFiLlama, Binance Research, as of June 30, 2023

Upon closer inspection of the competitive landscape, **centralized stablecoins remain the bedrock of the sector, making up over 90% of the overall stablecoin market.** MakerDAO's DAI remains the leader in the decentralized sphere, though Frax Finance's FRAX is steadily catching up, having gained 6.0% in market share YTD.

Tether's USDT, in particular, has been consolidating its market position amid the decreasing stablecoin market value, primarily at the expense of competitors such as Circle's USD coin ("USDC"). USDT's dominance became particularly pronounced in the wake of Paxos discontinuing the issuance of BUSD. In the ensuing market shift, **another player, TrueUSD ("TUSD"), emerged, managing to capitalize on the situation and capturing 2.4% of the global stablecoin market**[68]. With stablecoin consumers exploring viable alternatives to BUSD, TUSD was able to register a staggering increase of 330.5% YTD.

Figure 32: TUSD appears to be the favored option for users transitioning away from BUSD, while USDT has simultaneously demonstrated an exceptional 35.3% surge in its market share YTD

Stablecoin	Market Cap (US$B)		Market Share (%)		Volume (US$B)	
	Jun-23	YTD	Jun-23	YTD	Jun-23	YTD
USDT	83.3	25.8	65.0	35.3	43.6	166.9
USDC	27.7	-37.2	21.6	-32.5	6.4	308.3
DAI	4.4	-13.4	3.4	-6.9	0.2	104.9
BUSD	4.2	-75.0	3.2	-73.1	4.0	14.7
TUSD	3.0	300.3	2.4	330.5	2.7	10306.2
FRAX	1.0	-1.4	0.8	6.0	0.0*	116.6
USDP	1.0	14.2	0.8	22.8	0.0*	1382.7
Others	3.5	12.9	2.8	21.4		

*The figure is denominated in billions and may not necessarily have an absolute value of 0.0.
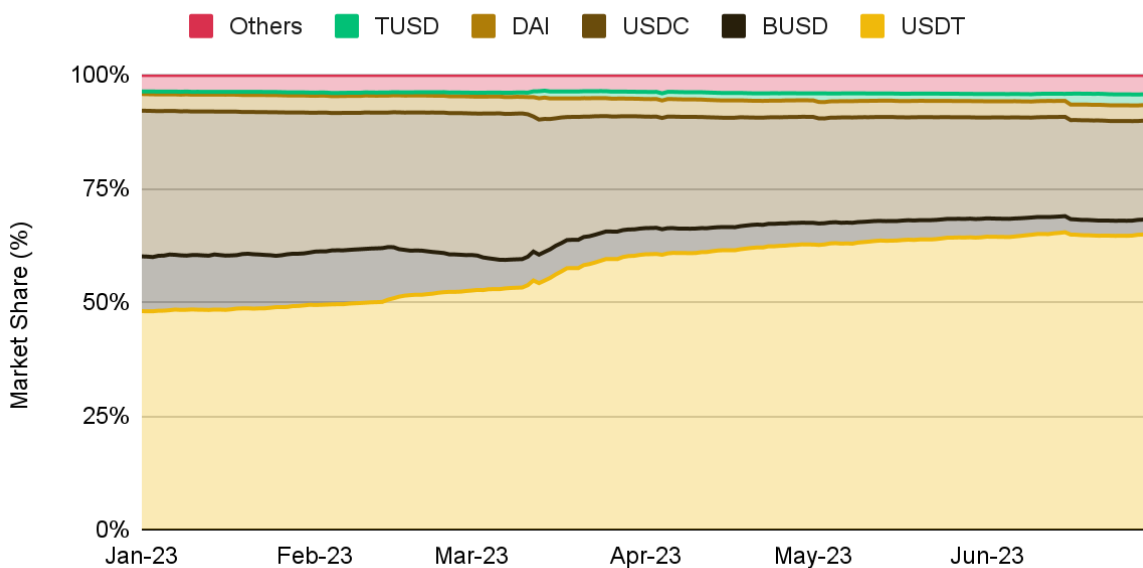Source: CoinMarketCap, DeFiLlama, Binance Research, as of June 30, 2023

USDT Fortifies Its Market Dominance

USDT stands out as a rare gainer, marking a significant rise in its market share during the first half of the year. **Indeed, since the year's onset, USDT has increased by 25.8% YTD, accumulating an impressive market cap of US$83.3B. Putting USDT's dominance in perspective, that is 65.0% of total stablecoin supply, a figure reminiscent of its 2021 status**[69]. Excluding TUSD, this feat stands in stark contrast to other major stablecoins, which have largely seen a decline in the same period.

Tether's expanding influence has certainly reshaped the power dynamics among the major trio of centralized stablecoins: USDT, USDC, and BUSD. This shift may have been largely driven by the changing preferences of users who aim to circumvent the uncertainties surrounding other stablecoins. Given the wind down of BUSD and apprehensions over the solvency of USDC-affiliated banks, USDT has capitalized on this to further expand its market share.

Notably, Tether's global presence as a non-U.S. entity may have further boosted user confidence by offering a perceived safeguard against risks associated with U.S.-based banks and the country's regulatory climate, especially in light of recent market events. This has likely contributed to the current trend of capital transition from BUSD and USDC towards USDT.

Figure 33: USDT reached a new high in 2023, controlling over 65% of the total stablecoin market

Source: DeFiLlama, Binance Research, as of June 30, 2023

Both Ethereum and Tron, commanding the lion's share of USDT holdings, continue to be the frontrunners in terms of the largest stablecoin supply in the ecosystem. **In particular, the first half of this year saw a US$16.1B decrease in the stablecoin market cap on Ethereum, largely due to a continuing trend of shifting from USDC to USDT**. Ethereum's USDC market cap declined by around US$14.9B, while USDT experienced a boost of approximately US$7.9B[70].

Figure 34: In the first half of 2023, USDT leapfrogged USDC, establishing itself as the stablecoin with the highest market share on the Ethereum network
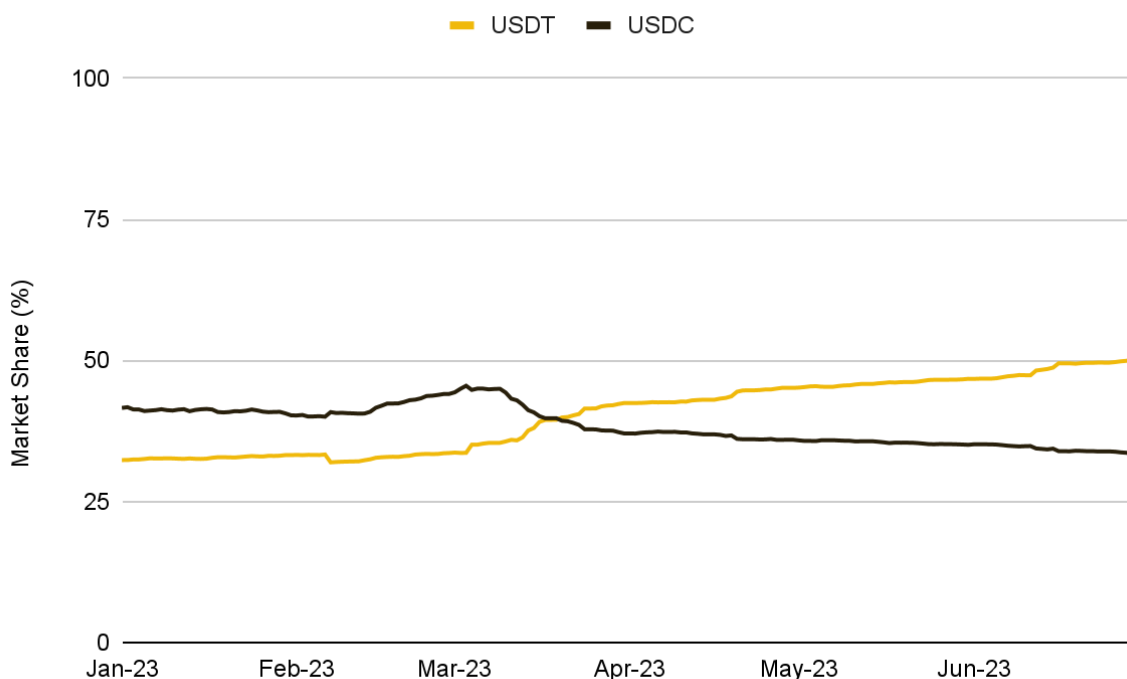
USDT supply on Tron was also on an upward trajectory, increasing to US$40.6B, which represents an estimated 92.4% of Tron's total stablecoin market cap[71]. **Given that USDT's total circulating supply peaked earlier this year, this certainly reinforces Tron's unique position within the stablecoin sector**.

A big contributor to Tron's USDT dominance has been attributed to recent developments enhancing stablecoin utility on the network. For example, BitGo announced support for Tron-based USDT for hot wallets and qualified custody[72], and Telegram released functionality enabling its users to send TRC-20 USDT to their contacts[73]. With Tron positioning itself as the ideal network for non-custodial storage of USDT, such integrations have certainly been welcomed by large holders of the stablecoin.

Figure 35: With a circulating supply of US$40.6B, Tron remains as the largest holder of USDT on its network
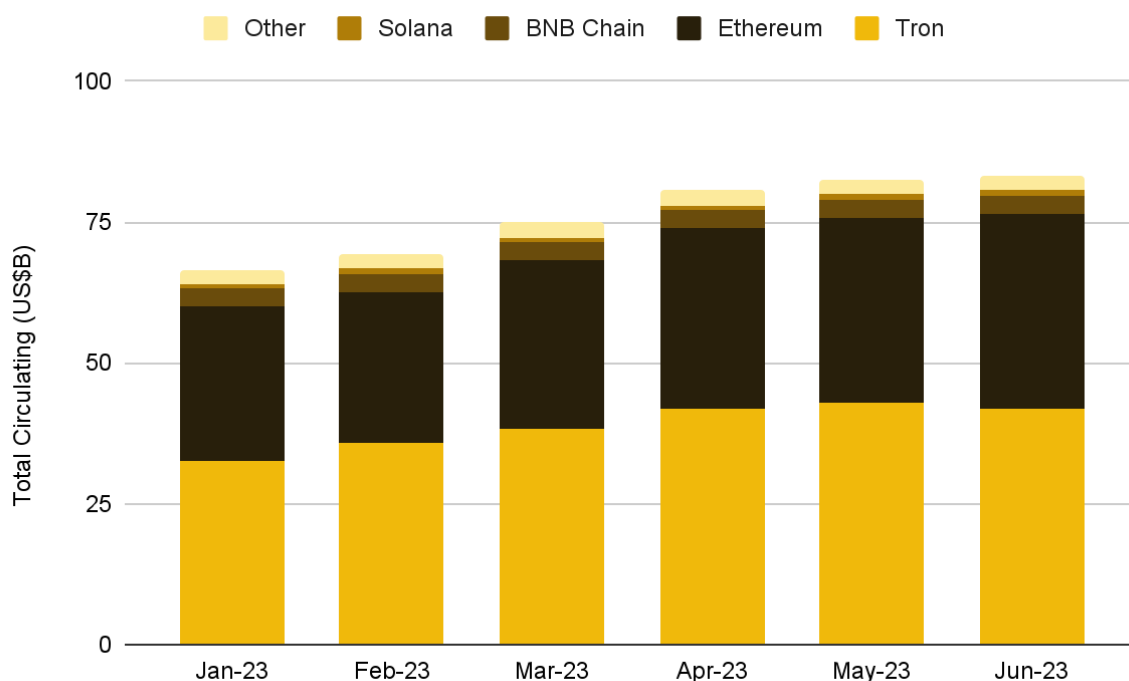
USDT expanding its reserves through the purchase of Bitcoin

Tether is planning to diversify USDT token reserves by investing 15% of its net profits into Bitcoin. According to Tether's CTO, Paolo Ardoino, this decision reflects Tether's conviction in Bitcoin as a resilient long-term store of value with substantial growth potential[74]. Given Tether is allocating net profits to the purchase of Bitcoin, it is able to effectively maintain a 100% USD backing while simultaneously benefit from a diversified portfolio.

Despite prevailing apprehensions surrounding the composition of USDT's reserves, Tether aims to alleviate concerns by strategically building up its excess reserves, which currently amount to US$2.44B, of which US$1.5B is allocated to Bitcoin[75]. This approach is reminiscent of their prior transition away from commercial papers to U.S. government debt securities, emphasizing Tether's on-going commitment in mitigating negative market sentiment.

USDC in Spotlight Amidst Banking Failures

Once boasting a market value of US$56B at its peak and a close second to USDT, USDC's market share has shrunk to 21.6%, reversing much of its progress achieved in 2022[76]. In a discussion with Bloomberg, the CEO of Circle highlighted the widespread anxiety regarding the US banking system and domestic regulatory climate as significant factors contributing to USDC's depleting market share in 2023[77].

The recent downfall of Silicon Valley Bank ("SVB"), a depository for many tech firms, including Circle, was one such event that brought USDC into the spotlight. **With Circle possessing US$3.3B in reserve deposits, the bank's collapse raised concerns over USDC's capital reserves and the full dollar collateralization of USDC**[78]. Speculation from this event precipitated a temporary depegging of USDC, with the stablecoin dipping to US$0.88 on several exchanges and even as low as US$0.80[79].

Simultaneously, the liquidity in both Curve's 3pool, primarily composed of USDT, and the USDC-USDT liquidity pool on Uniswap v3 was almost completely drained. Both protocols also witnessed their highest daily trading volumes during that period[80]. Given the volatility experienced in the crypto market over the last year, including the depegging of UST[81] and the insolvency of FTX[82], this abrupt sell-off of USDC can be considered an anticipated reaction, reflecting users' inclination towards pre-emptive selling as the optimal de-risking strategy.

Figure 36: The depegging from earlier in the year resulted in a massive sell-off of USDC by traders into Curve's 3pool, temporarily draining USDT liquidity from US$211M to below US$10M
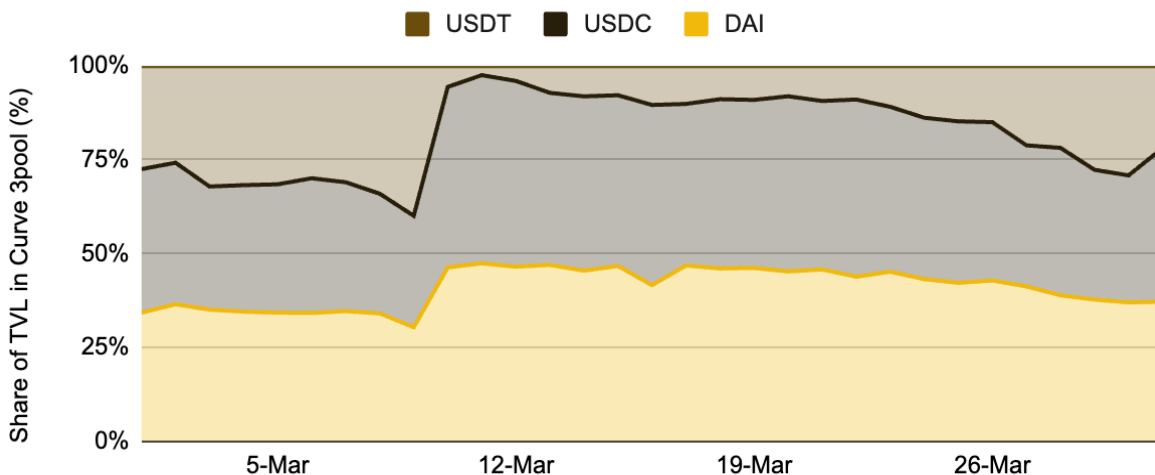

Source: Dune Analytics (@1ronman), Binance Research

Despite the turbulence and liquidation of three of its banking partners, Circle demonstrated its robustness by persisting with redemptions, even during a period of elevated transaction volumes that effectively stress-tested its operational capacity[83]. **Even though the event may have reignited market trust in Circle's ability to uphold the USDC peg, it has certainly impacted investor sentiment.**

The destabilization, however temporary, had implications far beyond its direct holders, causing concern among market participants and playing a major role in USDC's declining market share this year. More critically, this incident underscored the necessity of closely examining the reserves held by centralized stablecoin issuers, who were once believed to be impervious to depegging events. Such scrutiny is warranted, given the important role USDC plays in the DeFi ecosystem. It serves as a fundamental pillar across various functions, from forming liquidity pools on decentralized exchanges to acting as collateral in lending protocols and crypto-backed stablecoins[84].

For example, as illustrated in Figure 37 below, USDC constituted 48% of the collateral that was supporting DAI and 92% of the collateral that was supporting FRAX at the time. This resulted in further occurrences of stablecoin depegging in tandem with USDC, with DAI trading as low as US$0.897 and FRAX experiencing a similar devaluation, reaching US$0.885[85]. Following these incidents, both stablecoins have taken measures to safeguard themselves against similar vulnerabilities. DAI has reduced its reliance on USDC by adjusting its collateral ratio[86], while FRAX announced the retirement of the algorithmic component of its stablecoin[87].

Figure 37: The role of USDC as a primary collateral source for other stablecoins emphasizes the importance of its stability, especially in light of the cascading effects observed with DAI and FRAX

% Backing in USDC at Mar 12, 2023
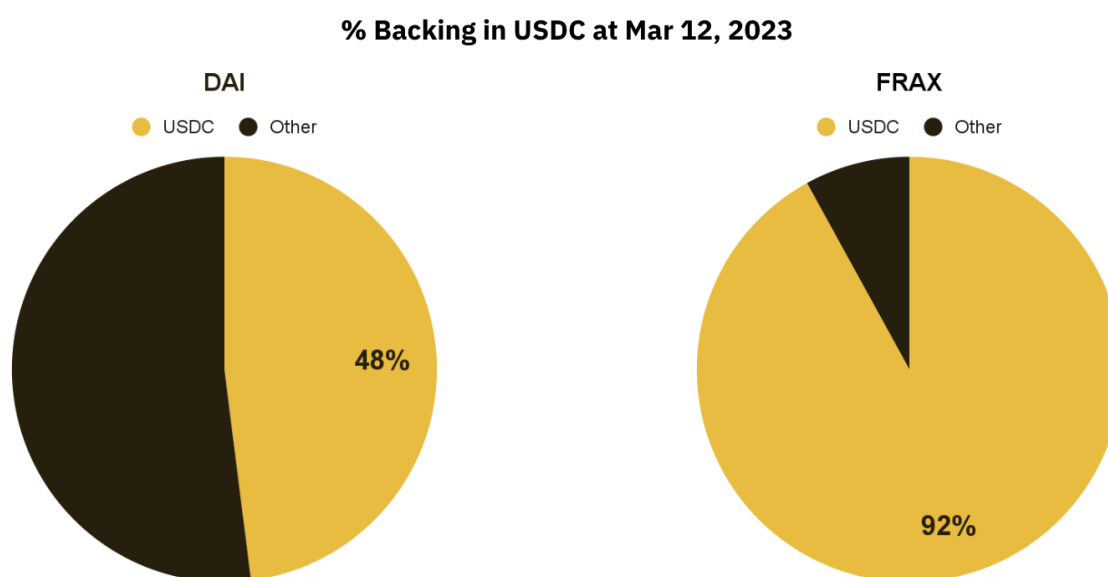
Source: Project teams, Binance Research

5.3 BUSD, DAI, and Regulatory Impacts

In an already tumultuous year for fiat-backed stablecoins, BUSD has encountered its own set of challenges. **Once a leading force in the stablecoin market, BUSD has witnessed a substantial reduction in its market share so far this year**. This came after the New York Department of Financial Services ("NYDFS") ordered Paxos, the crypto company responsible for issuing BUSD, to halt the stablecoin's minting[88]. **While BUSD has managed to sustain some market position for an extended period, the cessation of BUSD production is expected to steadily erode away its market cap.**

Following BUSD's wind down, TUSD, a stablecoin issued by Archblock, has been able to gain traction and has started to become a popular choice amongst users. **With an impressive 300.3% increase YTD in market value, TUSD has exhibited notable growth.** Adoption of TUSD surged after the elimination of maker fees by Binance on all TUSD pairs while reintroducing fees on notable BTC pairs with the exception of BTC/TUSD[89]. That said, TUSD has encountered regulatory obstacles itself, including complications with one of its providers, Prime Trust. The Nevada Financial Institutions Division ("NFID") ordered Prime Trust to halt deposits and withdrawals, resulting in a temporary halt to TUSD minting[90].

Though, unlike BUSD, which solely relied on Paxos, TUSD is more diversified and utilizes multiple USD on- and off-ramps, meaning Archblock could maintain TUSD's dollar peg despite the challenges with Prime Trust[91]. **Ultimately, TUSD has been able to make significant strides, with pairs accounting for 26.5% of Binance's spot volume, overshadowing the previously dominant BTC/USDT market and leaving BUSD pairs behind at 10.3%**.

Figure 38: TUSD has emerged as the top-performing stablecoin in 2023, experiencing significant growth and exerting greater influence on Binance's spot volume
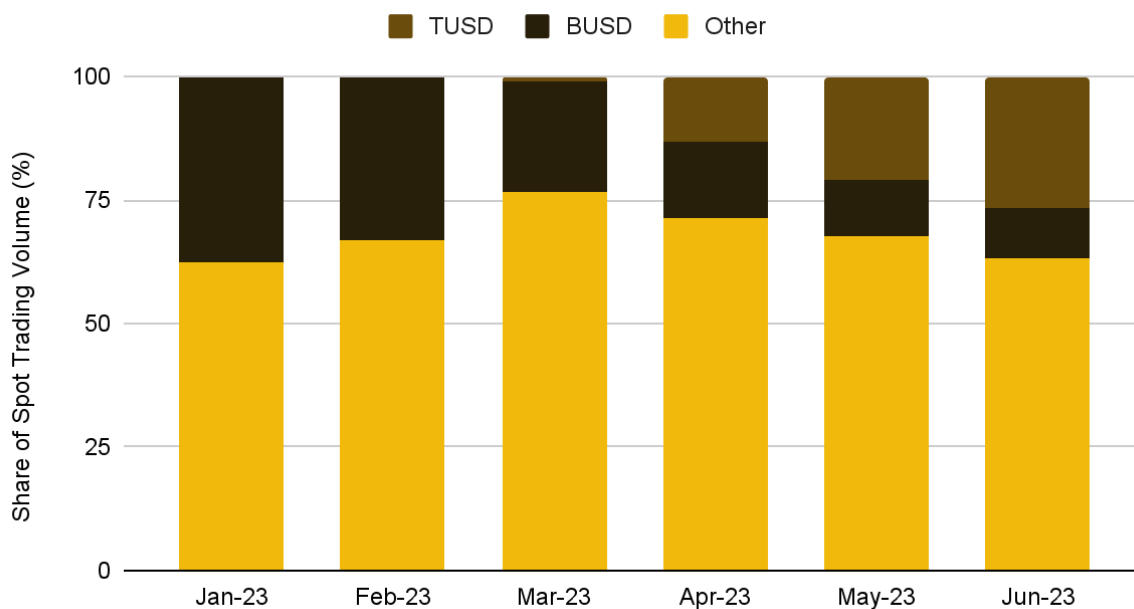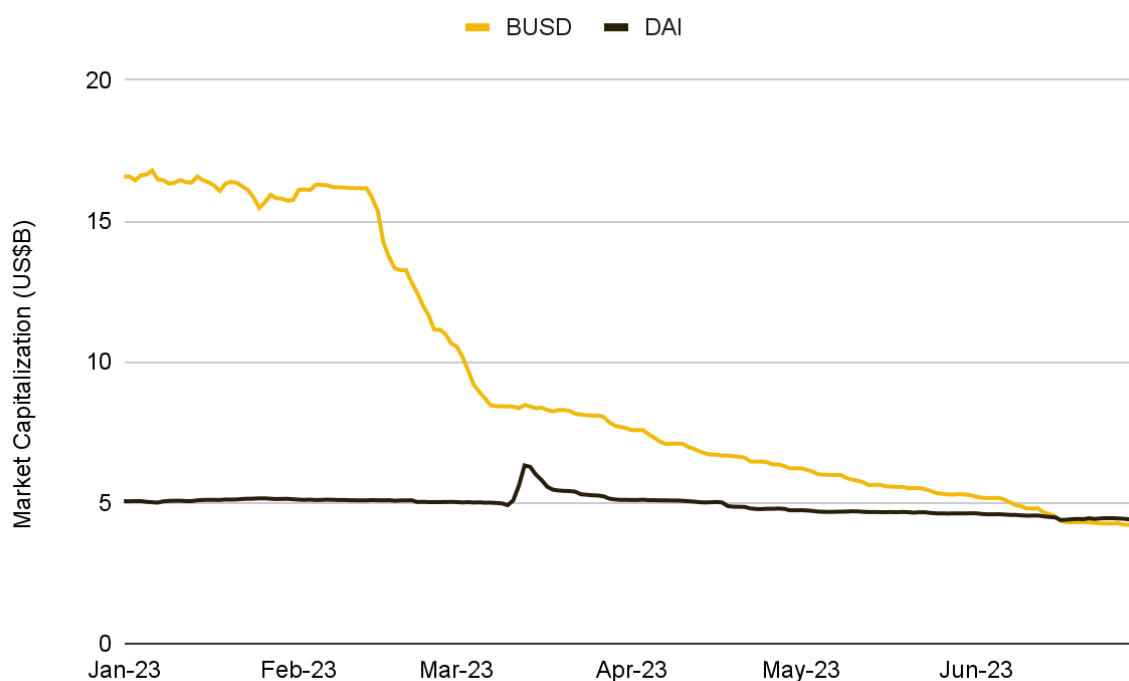

Source: The Block, Binance Research, as of June 30, 2023

The increasing challenges faced by centralized counterparts, as underscored by USDC's depegging during the SVB banking crisis, hint towards a gradual shift in the stablecoin landscape as decentralized stablecoins reclaim a substantial position. **DAI is positioning itself to overtake BUSD, demonstrating its resilience in a market traditionally dominated by fiat-backed entities**.

Despite a contraction in DAI's supply due to volatility in the market for crypto-collateralized stablecoins, it remains a relatively strong option for stablecoin users. In response to recent market events, MakerDAO has proposed a rise in the DAI Savings Rate ("DSR") to 3.49%, a move that could potentially spur an increase in the demand for DAI[92]. **Backed by other stablecoins, Ethereum, and more recently real-world assets ("RWAs"), DAI showcases the growing trend of a hybrid collateralization framework, incorporating both centralized and decentralized assets**[93]**.** This dynamic approach not only increases yield and diversifies risk, but also highlights MakerDAO's commitment to pragmatic solutions that adapt to market needs and conditions.

Figure 39: DAI is on course to cement its place as the third largest stablecoin provider

Source: DeFiLlama, Binance Research, as of June 30, 2023

Diversification of centralized reserves

There has been a notable trend towards the inclusion of U.S. Treasury securities in the reserves of major stablecoins over time. However, while this approach brings certain benefits, it also opens new channels of risk and raises concerns about their ability to maintain their pegs in the event of a U.S. technical default. Such a scenario would have significant implications for the entire crypto ecosystem, given the vital role stablecoins play in providing access to trading and DeFi, as well as being a source of collateral.

In the wake of the SVB banking crisis and ensuing regulations that cast doubt on the solidity of centralized stablecoins, we're observing a growing preference toward diversifying reserves across several mediums. **This strategy, aimed at removing a single point of failure, serves to enhance trust in the full redemption of these stablecoins, a factor that's also fundamental to their long-term sustainability.**

Stablecoin users are now increasingly vigilant, placing greater emphasis on assessing the counterparty risks associated with the stablecoins they choose to transact in. The demand for transparency and stability within issuer reserves is becoming paramount, emerging as important competitive differentiators among market players. **As the market matures, we anticipate this theme to be at the forefront, with stablecoin issuers that prioritize this likely to secure a competitive edge.**

Emerging Stablecoin Models

Most stablecoins gaining traction today incorporate some degree of centralization, either fully or as part of a hybrid model that intertwines centralization with aspects of decentralization. As explored in our previous discussions, DAI and FRAX stand as two successful examples of a hybrid model. **Yet, decentralized and algorithmic stablecoins have long been a captivating subject in crypto markets, particularly because they represent a high-priority goal: the creation of a sustainable, long-term asset in a space yet to achieve full decentralization**.

As the dynamic stablecoin market evolves, new stablecoins are making their entry, marking an exciting development in this field. Meanwhile others, such as FRAX, redefined their roles by stepping away from their algorithmic function following its temporary depegging earlier in the year. Figure 40 below provides a snapshot of some of the emerging stablecoins starting to penetrate the market and those possessing alternative models.

Figure 40: USDD stands as the leading algorithmic stablecoin, while the newly emerged crvUSD has begun to capture market share, growing 438.6% MoM

Stablecoin		Description	Market Cap (US$M)	
			Jun-23	YTD
💲	*USDD*	*Over-collateralized, crypto-backed algorithmic stablecoin issued by the Tron DAO Reserve*	737.1	3.6
💲	*LUSD*	*USD-pegged stablecoin used to pay out loans on the Liquidity protocol*	282.9	54.4
🪙	*MIM*	*Over-collateralized, crypto-backed stablecoin connected with the DeFi platform, Abracadabra*	136.1	54.3
💲	*sUSD*	*Synthetic stablecoin asset, powered by Synthetix, that tracks price of USD through Chainlink price feeds*	98.6	5.6
✖	*FPI*	*Algorithmic stablecoin pegged to the US CPI-U average*	89.0	16.6
Ⓜ	*MAI*	*Over-collateralized, crypto-backed stablecoin on the Polygon network*	57.2	8.3
🌈	*crvUSD*	*Collateralized debt position ("CDP") stablecoin connected with the DeFi platform, Curve Finance*	47.4	N/A

	GHO	*Collateralized debt position ("CDP") stablecoin connected with the DeFi platform, Aave*	N/A	N/A

Recent entrants to the decentralized stablecoin scene include Curve Finance's crvUSD and Aave's GHO, both signifying an interesting shift in the stablecoin market. **DeFi protocols are now venturing into creating their own stablecoins, complementing the myriad of products they already offer.** Such developments are a realization of FRAX founder Sam Kazemian's 'DeFi Trinity' theory, which infers that dominance and sustainability in the DeFi sector necessitates a project to have its own stablecoin, decentralized exchange, and lending protocol[94].

However, the impact of such a strategy is yet to be fully understood, particularly in a market already dominated by established stablecoin providers. These major stablecoin players like USDT not only command significant market shares, but they also offer vast liquidity and are deeply ingrained within DeFi products. What's more, traditional stablecoin providers enjoy considerable trust from a broad crypto user base, which is ultimately a crucial factor in determining liquidity placement for stablecoins – a factor that USDT has been successfully capitalizing on for its continued growth. **Nevertheless, if launching proprietary stablecoins yields positive results for the likes of Curve Finance and Aave, we could anticipate a similar trend to emerge amongst other DeFi protocols as well.**

crvUSD

Launched in May 2023, crvUSD has quickly made its mark, achieving a TVL of US$47.4M following an impressive MoM growth of 438.6%[95]. CrvUSD operates on a unique lending-liquidating AMM algorithm ("LLAMMA"), which assures price stability by converting between the collateral (for instance, ETH) and the stablecoin based on market conditions. As the collateral price rises, users can maintain their deposits in ETH, but as it dips, the algorithm converts them into USD. An interesting aspect of the LLAMMA model is its allowance for liquidity provider positions (LP tokens) to serve as collateral[96].

Diverging from traditional AMM designs, LLAMMA introduces a soft liquidation mechanism that transforms collateral into liquidity provider positions, effectively mitigating the risk of large asset dumps in short timeframes. In essence, Curve's stablecoin mechanism ensures price stability and liquidity by amalgamating the liquidity of various chains, employing diverse strategies, and capitalizing on composability with other DeFi projects. **This approach, by offering users opportunities to generate returns through transactions, borrowing, lending, and liquidity mining, is poised to catalyze a heightened level of participation within its ecosystem**.

GHO

Set to launch soon, GHO is a multi-collateral stablecoin pegged to the US dollar and minted through Aave. It is designed for various applications, including payments, lending, and borrowing, and offers yield generation through automatic participation in liquidity mining on Aave. Currently, Aave V3 is the exclusive liquidity pool provider for GHO, meaning that owning this stablecoin is restricted specifically to the Aave platform. This arrangement ensures all revenue generated from GHO is channeled into the Aave Treasury, ultimately governed by the Aave DAO, while also envisioning a more decentralized future through the addition of an increased number of liquidity pool providers[97].

GHO represents an innovative, decentralized stablecoin that generates yield and offers competitive advantages through seamless interoperability with other Aave services. However, its stability, hinged on the liquidity and value of its collateral, can be susceptible to market fluctuations. Therefore, the degree of GHO's decentralization and its risk management mechanisms warrant careful consideration, particularly as the introduction of additional liquidity pool providers may add risk and further distribute interest.

6 Decentralized Finance

6.1 State of DeFi

Despite a year of tempered growth in 2022, the first half of 2023 has been marked by a steady, upward progression for decentralized finance ("DeFi"). **Since the onset of the year, DeFi TVL has increased an estimated 16.7% YTD to US$44.2B**. The continued commitment of substantial capital, amounting to billions of dollars within a wide array of DeFi protocols, attests to the sector's pivotal role within the digital asset industry. Today, from being a fundamental force behind thriving L1 and L2 ecosystems to shaping essential use cases in stablecoins, staking, and NFTs, DeFi is unequivocally embedded throughout the wider crypto industry.

Approaching the halfway mark of this year, notable developments have been observed in the DeFi landscape, particularly in the areas of liquid staking, decentralized exchanges ("DEXes"), lending and derivatives. Although the market is still in its early stages, the DeFi sector is projected to reach a substantial revenue milestone of US$231.2 billion by 2030[98]. As we explore the emerging trends surrounding the DeFi sector, we also keenly anticipate the developments that are yet to unfold in the remainder of 2023.

Figure 41: DeFi TVL has remained relatively stable in H1 2023, increasing 16.7% YTD
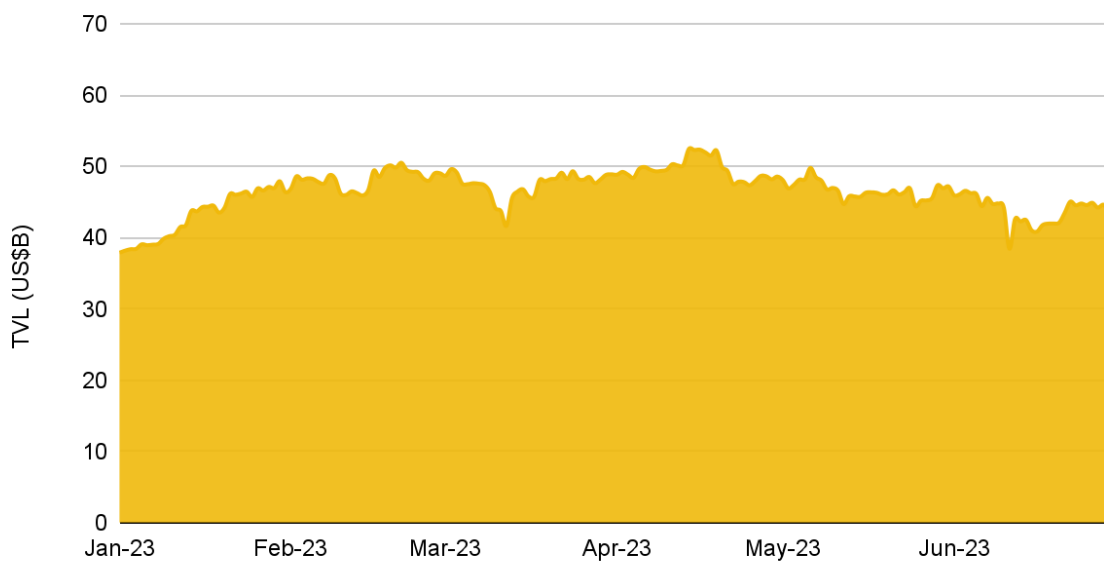
Please note: The DeFi TVL considered in this figure excludes Liquid Staking.
Source: DeFiLlama, Binance Research, as of June 30, 2023

However, the perspective shifts slightly when we compare DeFi with the broader global cryptocurrency market. **Upon examining Figure 42 below, we observe that DeFi's market dominance has experienced a decline during the first half of this year, currently resting at 3.8%.** This implies that despite experiencing growth, DeFi's overall expansion has been slower relative to the wider crypto market, indicating a potential shift in demand toward other crypto sectors.

Figure 42: DeFi dominance, defined by DeFi market cap as a percentage of global cryptocurrency market cap, has experienced a modest decline since the beginning of the year
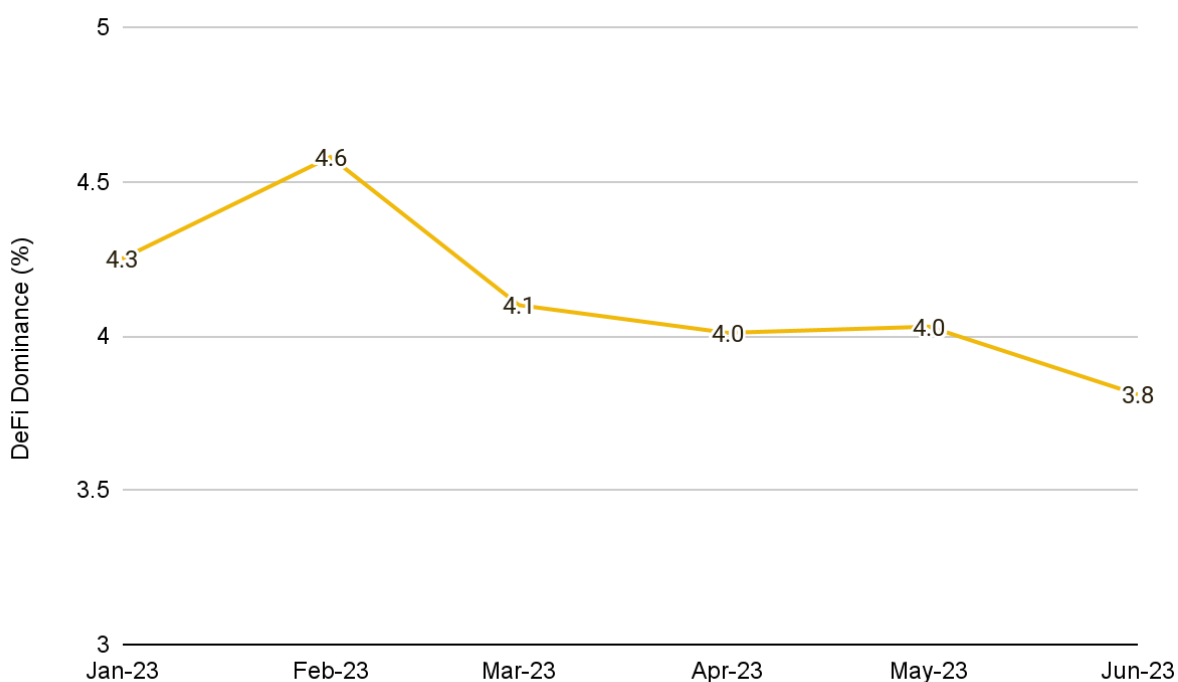
Please note: The DeFi market cap used in this calculation is derived from a selection of popular DeFi protocols. The sample is generally representative of the underlying trend.

Source: The Block, Binance Research, as of June 30, 2023

Nonetheless, DeFi products continue to attract a significant number of crypto users, with transaction activity continuing to paint a promising picture. **Indeed, the trend for this year shows a positive shift in user engagement for DeFi protocols, with the number of unique users per month climbing from an average of 2.5M to 3.6M.**

Figure 43: The number of unique monthly users across all DeFi protocols has followed a positive trend, marking an estimated growth of 42.5% YTD
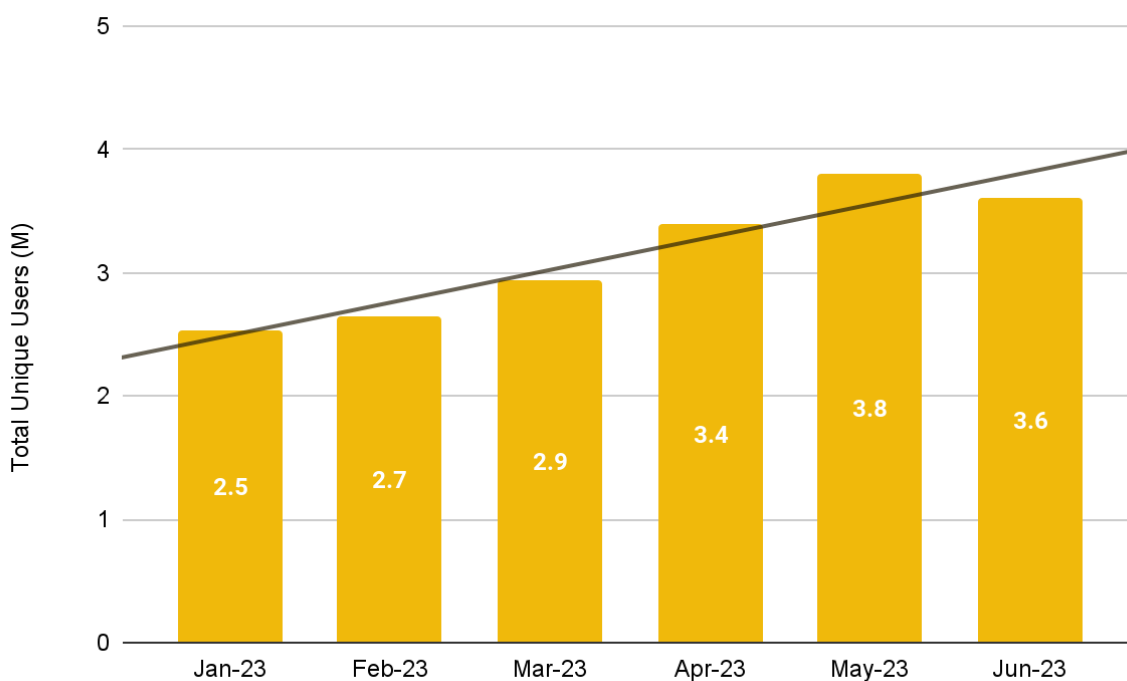
Source: Dune Analytics (@rchen8), Binance Research, as of June 30, 2023

The increasing activity in DeFi is further amplified by recent trends in DEXes, which have seen a noticeable appreciation in trading volumes, particularly when contrasted with centralized exchanges ("CEXes"). **Inspection of the DEX to CEX spot ratio uncovers a compelling increase in activity, appreciating from 9.6% at the beginning of the year to a significant 16.8%**. This higher activity is likely fueled by recent sentiment shifts away from centralized entities, causing a migration of users toward decentralized alternatives.

Such a shift, when combined with the ongoing innovations and successful achievement of product-market fit by DEXes, suggests the trend is likely to maintain its upward trajectory for the rest of the year. Unfortunately, the same optimism is not replicated when evaluating the futures market, though this may be largely due to the sector's relative infancy.

Figure 44: DEX to CEX spot trade volumes have seen strong growth this year, whereas future ratios remain relatively stable
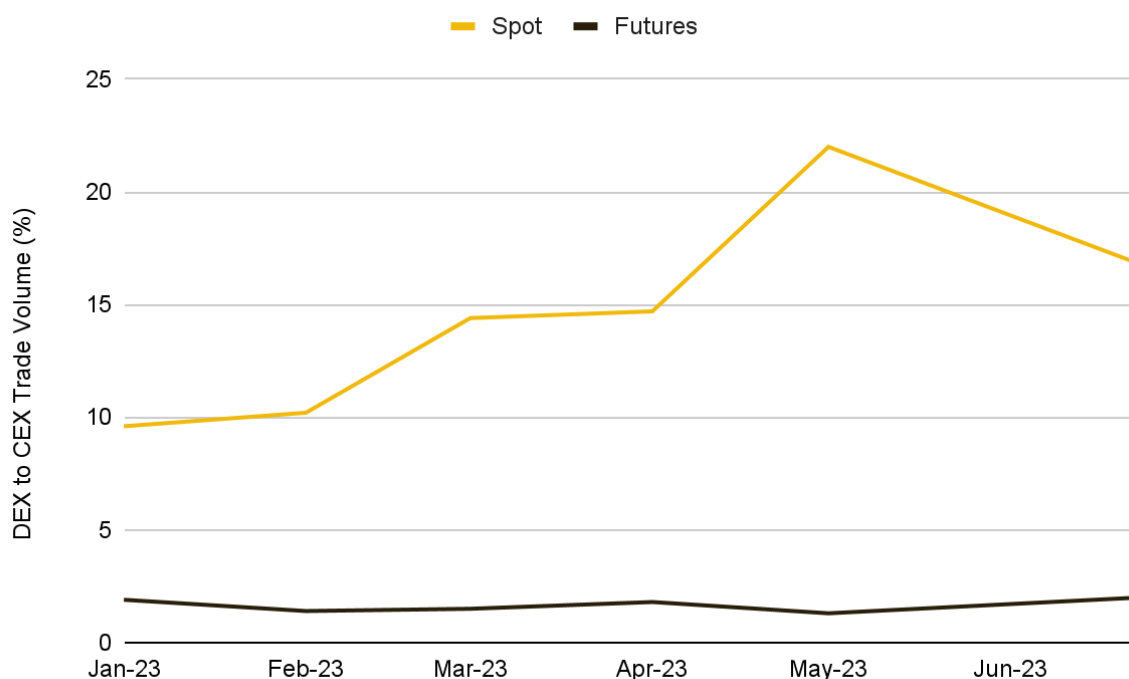
Source: The Block, Binance Research, as of June 30, 2023

Taking a closer look at the distribution of the DeFi space, it becomes evident that Ethereum remains the dominant player in the industry, accounting for US$26.6B of the total US$45.3B in the sector. Interestingly, despite its commanding position, Ethereum's market share has stayed relatively stable since the start of the year, suggesting that the primary source of growth has instead been occurring on other chains.

As Figure 45 below illustrates, Tron has ramped up its share of DeFi TVL by a significant 16.8% YTD, while BNB Chain has faced a decrease of 31.7% YTD. **Notably, L2 solutions have made impressive strides, underscoring the rising importance of such solutions in the evolving DeFi ecosystem**. One standout example is Arbitrum, which has grown from a modest US$978.4M at the beginning of the year to US$2.2B, thereby earning its position as the 4th largest protocol by TVL.

Figure 45: Capturing 58.4% of DeFi TVL, Ethereum continues to maintain a stronghold in the DeFi sector, while Tron network and L2s are beginning to show signs of growth
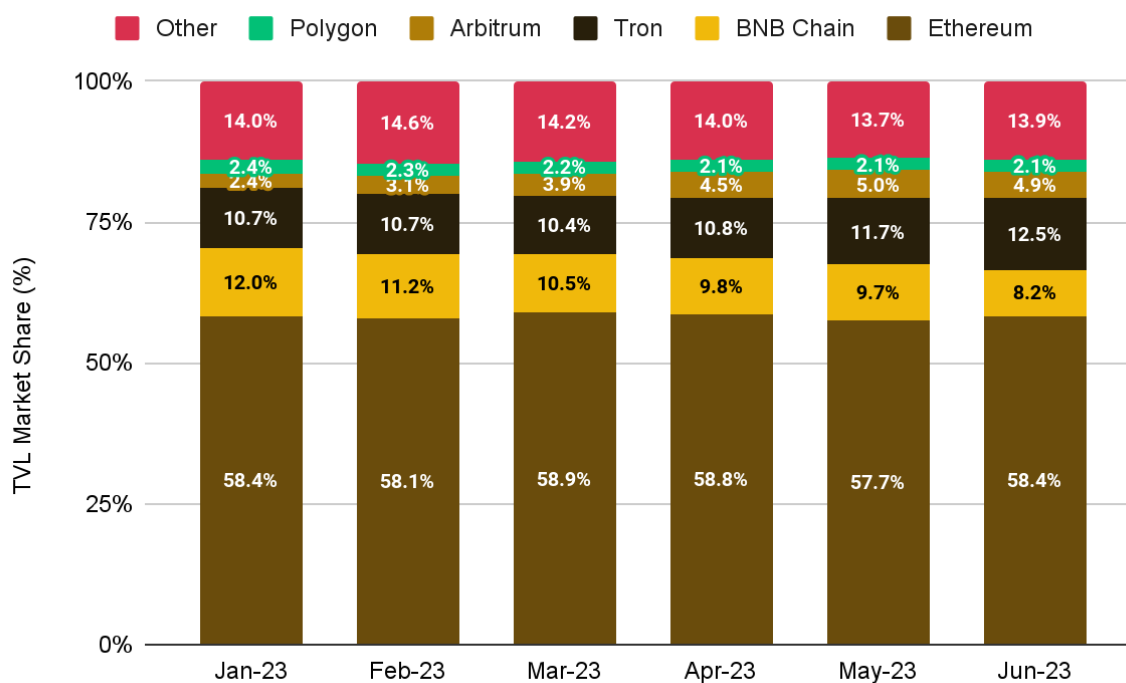
Please note: The DeFi TVL considered in this figure excludes Liquid Staking.
Source: DeFiLlama, Binance Research, as of June 30, 2023

In analyzing the performance of various DeFi protocols across different chains for H1 2023, notable trends have emerged, particularly within Ethereum's ecosystem. At the onset of 2023, the market share dominance of Lido and MakerDAO was neck-and-neck, with MakerDAO even edging slightly ahead on January 1st by about 0.5%[99]. **However, as the year unfolded, liquid staking protocols, significantly boosted by Ethereum's Shapella upgrade that enabled withdrawals, surged in importance**[100]. This trend, coupled with the financialization of liquid staking tokens (LSTfi), has led to a remarkable shift in market dominance.

Lido now controls almost double its initial market share, registering at 22.2%, which is also more than twice the current share of its early rival, MakerDAO. **Indeed, Lido's ascent signals a shift from Ethereum's traditionally fragmented DeFi landscape to a structure more similar to other chains, where the majority of TVL is often concentrated in one or two dominant protocols.** The proliferation of liquid staking is expected to persist throughout the year as DeFi expands its footprint and develops use cases in this area.

While Aave has experienced some growth, propelling it to second place, most of the market share appears to have migrated to liquid staking protocols. Despite being on a downward trajectory throughout much of the year, Uniswap has managed to regain some market share in the past month. This recovery can likely be attributed to the much-anticipated

announcement of Uniswap v4[101]. **Overall, liquid staking has surged as a primary catalyst for DeFi TVL on Ethereum, while yield, collateralized debt position ("CDP"), and DEXes have faced a decline.**

Figure 46: Today, Lido stands as the leading contributor to Ethereum's DeFi TVL, having soared in H1 2023 to capture approximately 22.2% of the market
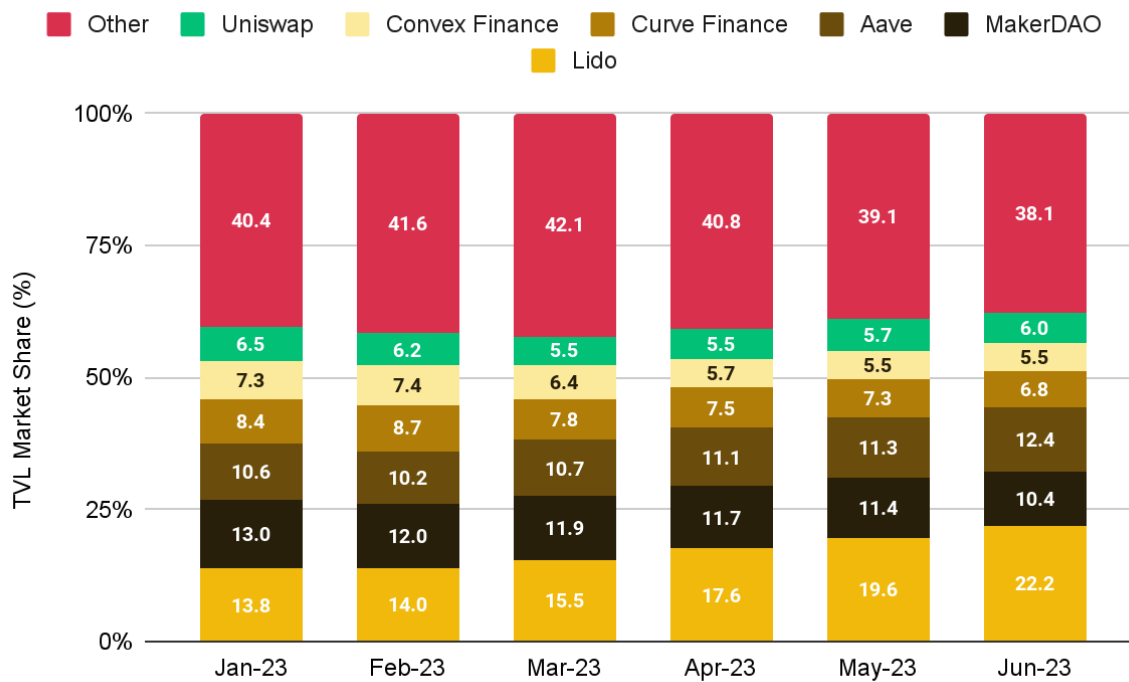
Source: DeFiLlama, Binance Research, as of June 30, 2023

Switching focus to BNB Chain, the landscape is quite different, characterized by distinctive protocols and market dynamics that set it apart from Ethereum. **Dominated by DEXes and lending protocols in PancakeSwap and Venus, these entities jointly control 60.3% of BNB Chain's DeFi TVL.**

Despite a downward trend throughout H1 2023, PancakeSwap remains a cornerstone in BNB Chain's DeFi landscape, accounting for 34.8% of the market's TVL. The first half of the year also saw Venus Protocol exhibit MoM growth, expanding its market share by approximately 31.1%. Another highlight has been the launch of Radiant v2[102]. This newcomer has rapidly gained traction, emerging as one of BNB Chain's largest DeFi protocols to control approximately 3.9% of TVL market share in a matter of months.

Figure 47: BNB Chain's DeFi TVL continues to be predominantly held by PancakeSwap and Venus, collectively commanding 60.3% of the market
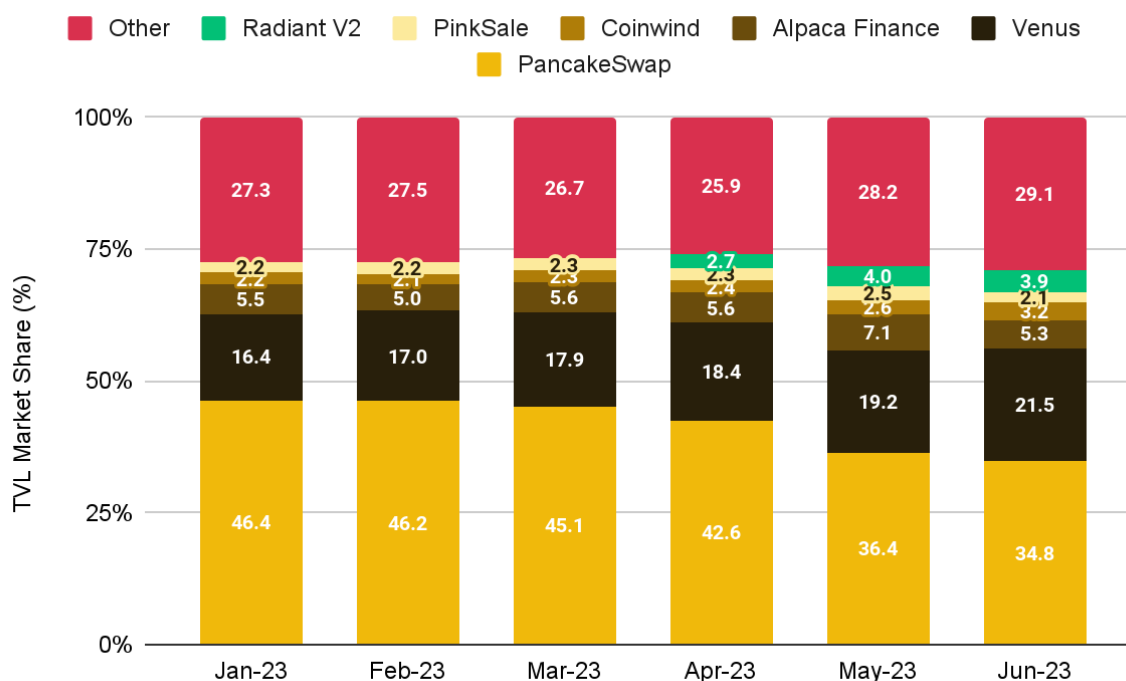
Source: DeFiLlama, Binance Research, as of June 30, 2023

While liquid staking has flourished on Ethereum, DEXes and lending protocols remain key drivers of TVL on some of the other L1s. It's apparent that the rapid ascension of liquid staking seen on Ethereum has yet to be replicated elsewhere, hinting at untapped growth possibilities on some of these other chains. Taking a comprehensive look at various DeFi categories gives us a broad perspective on their performance. Figure 48 below provides a snapshot of how the distribution of market share for different DeFi categories has evolved from the beginning of the year to now.

Unsurprisingly, liquid staking emerged as the top gainer, bolstering its market share by a remarkable 74% to dominate the overall DeFi landscape. **This surge appears to have eroded the market shares of DEXes, which fell from 23.2% to 17.9%, and other sectors, including CDP, yield, and minor DeFi categories**. However, lending and bridging remained fairly consistent, with modest gains of 0.2% and 0.6%, respectively, demonstrating resilience against the market shift.

Upon closer examination, we notice that some smaller contenders, each boasting a TVL of at least US$100M, also made significant strides. **Specifically, indexes, NFT lending, and RWAs each experienced an estimated doubling or more of their TVL market share**. These sectors certainly underscore potential growth areas to monitor as we venture into the latter half of the year[103].

Figure 48: Snapshot comparison of DeFi categories' TVL market share on January 1 and June 30, 2023
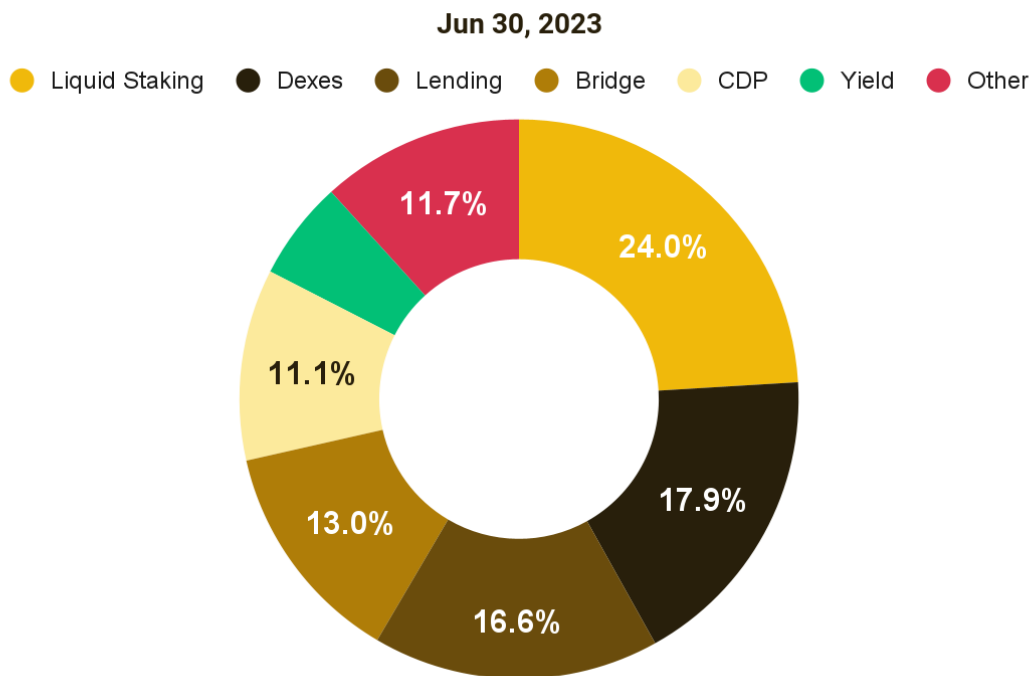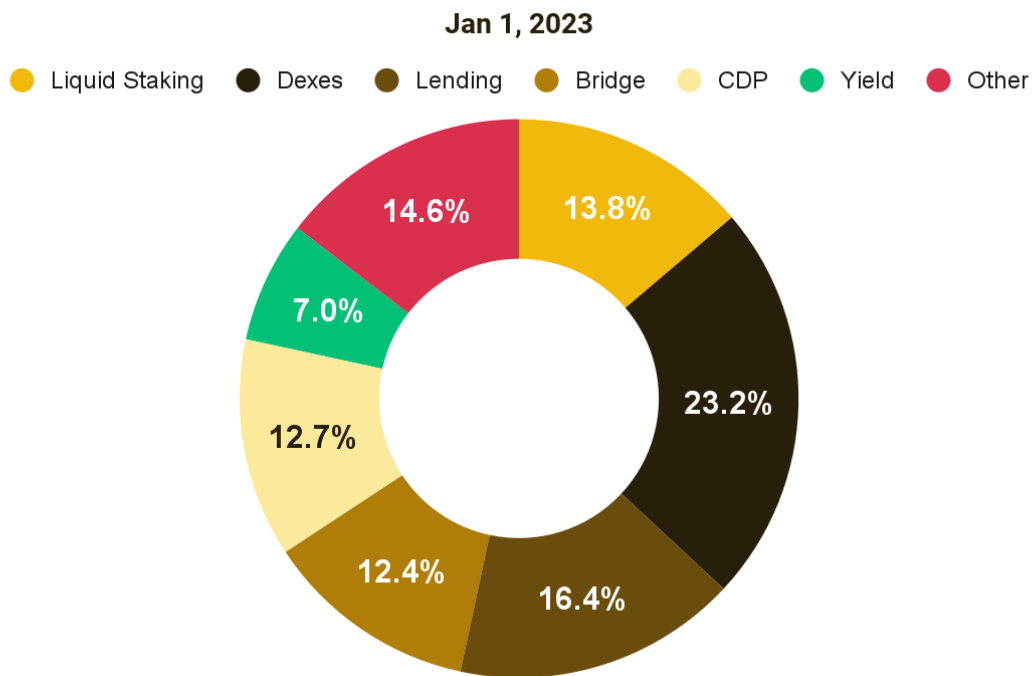
Source: DeFiLlama, Binance Research

While it is not uncommon for a few protocols to dominate TVL in DeFi, having multiple up-and-coming players is essential for cultivating a competitive landscape. Interestingly, an analysis of the distribution of TVL across various DeFi categories reveals distinctions in terms of how capital is concentrated. The liquid staking category, largely monopolized by Lido, has an incredibly concentrated TVL among just a handful of protocols. Lending, bridge, and CDP echo this trend, albeit to a lesser degree. Contrastingly, categories such as DEXes and yield, as well as other emerging sectors, present a more distributed TVL across a larger number of protocols.

Figure 49: Liquid staking's TVL is highly concentrated in select protocols, presenting a sharp contrast to other DeFi categories like DEXes, which have a more widespread distribution
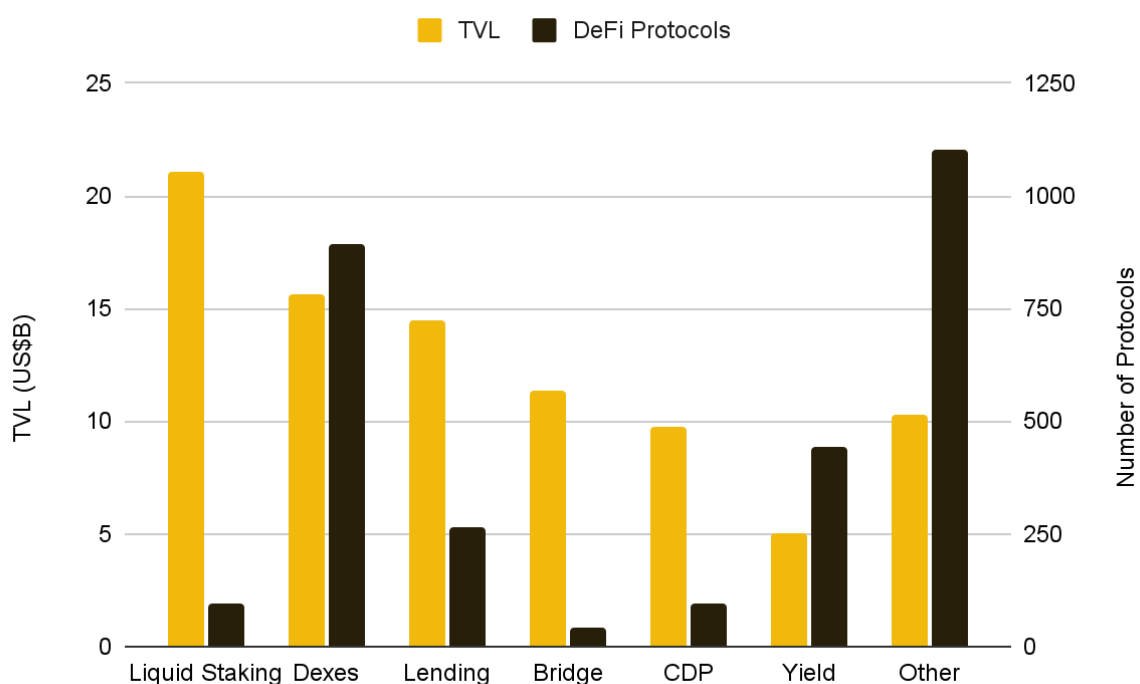
Source: DeFiLlama, Binance Research, as of June 30, 2023

To gain deeper insights into the DeFi landscape and its evolution in H1 2023, we will now explore some of the key categories that have played a significant role in shaping the sector during this period.

Liquid Staking

Despite the relatively slower adoption of liquid staking across other blockchain networks, the successful transition of Ethereum to proof-of-stake ("PoS") and the introduction of staked ETH withdrawals have fueled significant growth in staking, resulting in the emergence of liquid staking tokens such as stETH, rETH, WBETH, and more[104].

These liquid staking protocols have made staking more accessible by reducing technical barriers and capital requirements, enabling users to retain liquidity while participating in staking. **Increased capital efficiency, yield farming opportunities, and stronger network security are some of the benefits of liquid staking, all of which have propelled the sector to become the largest category in DeFi today, commanding approximately 24% of the market share.**

Figure 50: Liquid staking first emerged as the new leader in TVL on April 28, 2023, after having surpassed the long-reigning DEXes by a US$6.8M difference
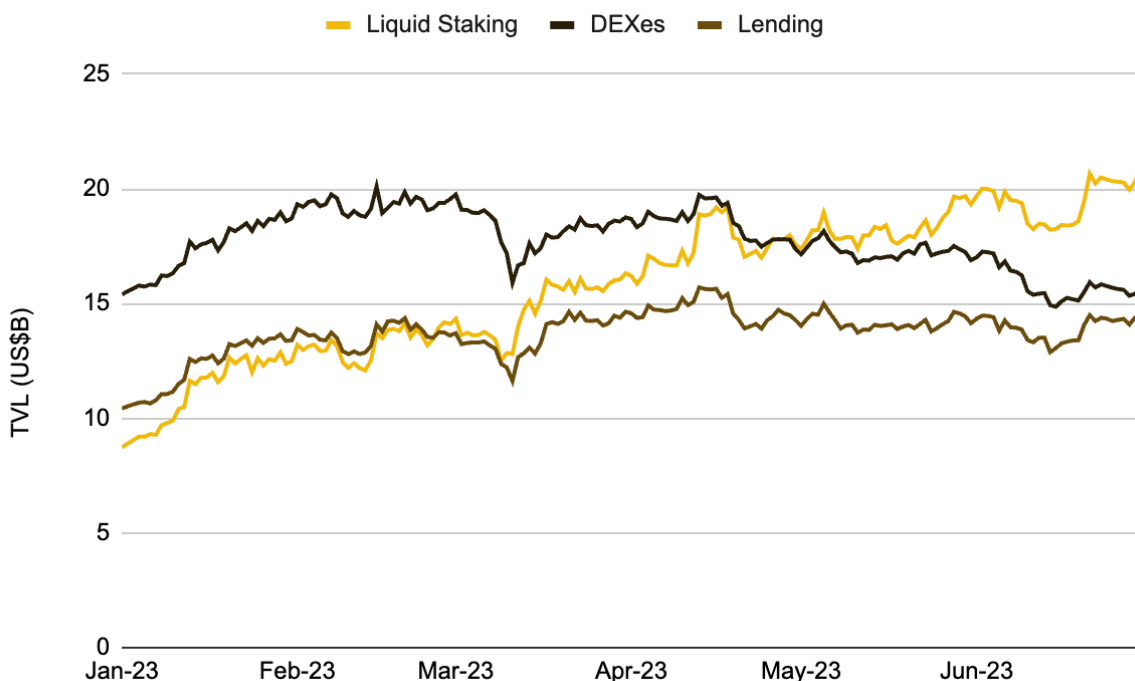
Source: DeFiLlama, Binance Big Data, Binance Research, as of June 30, 2023

The advent of liquid staking is catalyzing a wealth of additional use cases, as demonstrated by the rising popularity of LSTfi and the novel concept of restaking. LSTfi protocols are built on top of LSTs and offer additional yield-generating opportunities for holders, unlocking new value and horizons in the DeFi space. This powerful combination of liquid staking and LSTfi provides innovative ways to maximize yield and actively engage in the broader crypto ecosystem. Meanwhile, restaking serves as a rehypothecation function where stakers are able to repurpose their staked assets to secure other applications built on the network. **With its promising potential and ability to push the boundaries of DeFi, the fusion of liquid staking and LSTfi, complemented by the early-stage, yet intriguing, phenomenon of restaking, emerge as key themes**[105]. These themes are certainly worth closely following for the remainder of the year.

Examining the liquid staking market, the first mover advantage of Lido is clearly discernible, maintaining its dominance with a 75.4% market share. **With such a high level of market dominance, Lido has established an extensive integration network across diverse DeFi protocols, showcasing the protocol's deep liquidity in the ecosystem.** This in turn amplifies its attractiveness for users seeking to stake, earn yield, and swap LSTs on the Lido platform, leading to a self-reinforcing cycle of positive growth.

Even though Lido's growth in market share throughout the year has been relatively steady, other providers have started earning the confidence of an increasingly diverse liquid staking user base. Remarkably, with the exception of Ankr, the rapid expansion of the liquid staking sector is so significant that every protocol has recorded substantial growth in the quantity of staked assets since the beginning of the year.

Notably, Rocket Pool and Frax Ether emerged as significant gainers, experiencing a 55.8% and 228.6% surge in their market share YTD, respectively. The increased competition from these protocols is certainly welcomed, as it helps exert competitive pressure on the industry leader, Lido, fueling further innovation in this growing space. However, it's worth noting that much of their market share gains have so far not been at the expense of Lido. Instead, they have capitalized on the slower progress of Coinbase's Wrapped Staked ETH, which has lost some ground, experiencing a 23.5% YTD decrease in market share.

Figure 51: Lido continues to assert its monopolistic dominance in the liquid staking sector, boasting an overwhelming market share of over 75%

Protocol	Assets Staked (US$B)		Market Share (%)	
	Jun-23	YTD	Jun-23	YTD
Lido	14.2	143.1	75.4	0.4
Coinbase Wrapped Staked ETH	2.2	85.2	11.7	-23.5
Rocket Pool	1.5	277.5	8.1	55.8
Frax Ether	0.4	674.9	2.3	228.6
StakeWise	0.2	72.6	0.9	-30.8
Ankr	0.1	-3.2	0.7	-61.1
Stader	0.1	67.9	0.3	-40.0

Source: Token Terminal, Binance Research, as of June 30, 2023

From the above protocols, we are also witnessing Frax make significant progress towards decentralization with the introduction of frxETH V2[106]. The new version will enable node validators to participate in a decentralized, permissionless ETH borrowing market that operates on a peer-to-peer model. Such a system enables validators to borrow ETH at market rates and further reduces reliance on centralized authorities.

What's more, sfrxETH holders have the opportunity to earn interest by channeling unutilized ETH into the Curve Algorithmic Market Operation ("AMO") smart contract, thereby boosting liquidity and providing stronger incentives for participation[107]. **The combination of these upgrades certainly has the potential to increase Frax's TVL further once the new version launches.**

LSTfi

Dwelling deeper into the LSTfi sub-sector, the ecosystem consists of both established DeFi protocols integrating LSTs as well as newer projects centered around LSTs. **Having experienced a rapid 460% growth since April, LSTfi protocols now command a TVL surpassing US$600M.** This growth has been supported by increased staking activity post-Shapella upgrade, driving the adoption of liquid staking. Yet, the current TVL of approximately US$600M in LSTfi protocols accounts for a mere estimated 3.6% penetration of the liquid staking sector, which presently holds over US$21B in value[108], indicating the significant untapped growth potential of LSTfi as a sub-sector.

Figure 52: The top 5 players in the LSTfi space currently hold over 81.9% of TVL, with Lybra emerging as the market leader
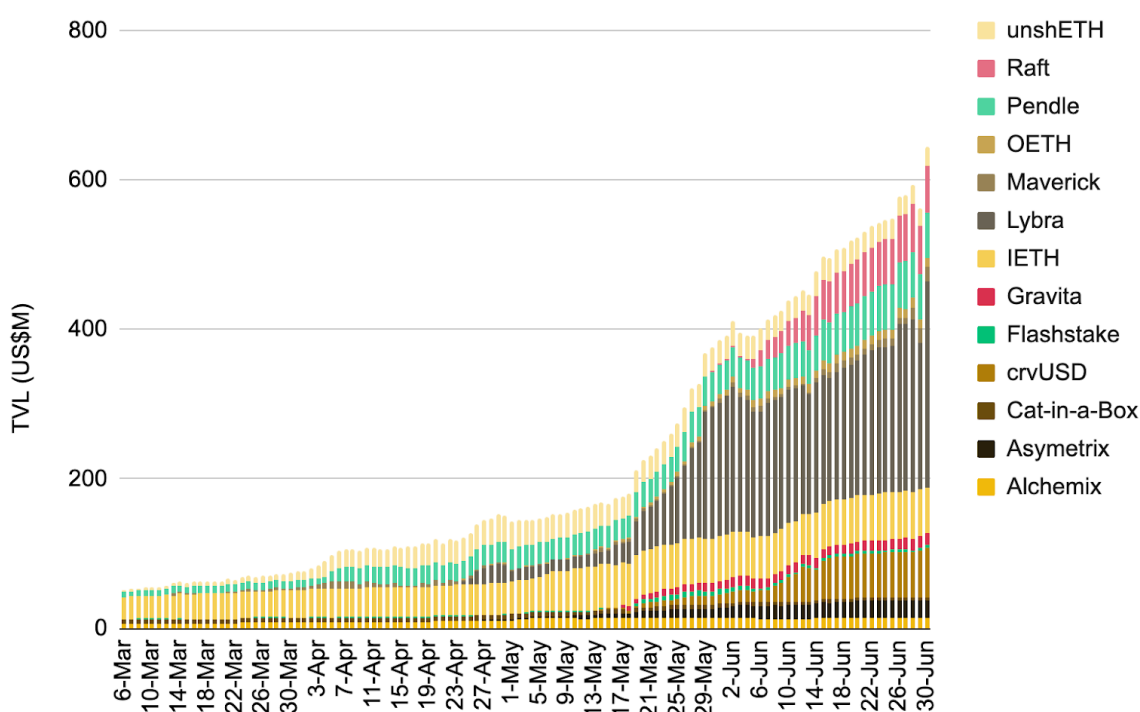
Source: Dune Analytics (@defimochi), Binance Research, as of June 30, 2023

As of today, the sector is predominantly controlled by five protocols: Lybra, crvUSD, Raft, IETH, and Pendle, which collectively account for a substantial 81.9% of the market share, with the remainder being filled out by other participants. **In a similar light to Lido, Lybra has emerged as the undeniable leader in the LSTfi sector with a TVL of US$277M, controlling approximately 43% of the total market share.** However, given the sector is still in its nascent stage, the market landscape is likely to transform significantly as the year advances. The dynamic nature of the sector is certainly exemplified by crvUSD's remarkable ascendance; within a month, it has emerged from obscurity to become the

second-largest player, amassing a TVL of US$65.3M and already representing approximately 10.1% of the market.

The Emergence of Restaking

Before diving further, it is important to note that restaking, as a novel primitive, is currently classified under the umbrella of liquid staking. However, given the ever-changing nature of this sector, it is conceivable that it may require its own distinct categorization in the near future.

Put simply, restaking aims to provide simultaneous security for multiple networks while generating additional yields for users. Restaking as a concept enables validators to opt-in to transaction mining for other blockchains, thereby enabling users to stake the same ETH on both Ethereum and other protocols. **Restaking aims to resolve the fragmentation in blockchain security, a challenge faced when building new decentralized networks**[109]**.** Establishing a form of crypto-economic security, as seen in Ethereum through staking ETH tokens, can be inefficient and costly for newer services, often falling short of Ethereum's standards as well. Many projects consequently feel compelled to issue their own tokens while laboriously creating their own security systems. As a result, restaking addresses such problems by aggregating Ethereum's robust security infrastructure and making it available for other applications to leverage.

EigenLayer

EigenLayer is one of the key projects propelling the advancement of the restaking sector. Positioning itself as an "Ethereum restaking collection," EigenLayer aims to establish a marketplace for decentralized trust by permitting Ethereum stakers to leverage their staked ETH to secure other network applications, earning revenue in the process. To facilitate this, stakers grant EigenLayer additional slashing rights on their staked ETH. Essentially, EigenLayer, through its smart contracts, enables staked ETH to secure applications beyond Ethereum, extending Ethereum's base layer security to services built upon it, known as actively validated services ("AVS")[110].

In terms of recent developments, EigenLayer's recent stage 1 mainnet launch[111] attracted considerable attention. **The three restaking smart contracts (stETH, rETH, and cbETH) reached their maximum allowance of 3,200 LSTs per protocol within just 24 hours, resulting in an estimated influx of approximately US$16M**[112]. The pools attracted a total of 873 unique depositors, while the top ten holders collectively accounted for 38.7% of staked assets[113]. Interestingly, stakefish, which is a staking-as-a-service ("SaaS") provider, holds the position of the third-largest staker on the Eigenlayer platform to date. **Such interest highlights the growing demand for restaking primitives and reinforces staking as an enticing alternative to traditional DeFi yields**.

As a result, EigenLayer has already announced that the limits for LSTs will soon be raised to 15,000 tokens per LST, with a global pause on LST restaking set to take effect once total deposits reach 30,000 tokens[114]. Moreover, EigenLayer recently declared that there will be no cap on native restaking, thereby enabling users to continuously create EigenPods and associate them with an unlimited number of validators. Both measures aim to encourage increased user participation in future restaking opportunities.

Figure 53: The stage 1 mainnet launch of EigenLayer witnessed a total of 873 unique depositors, with the top 10 holders representing 38.7% of the LST TVL on the platform
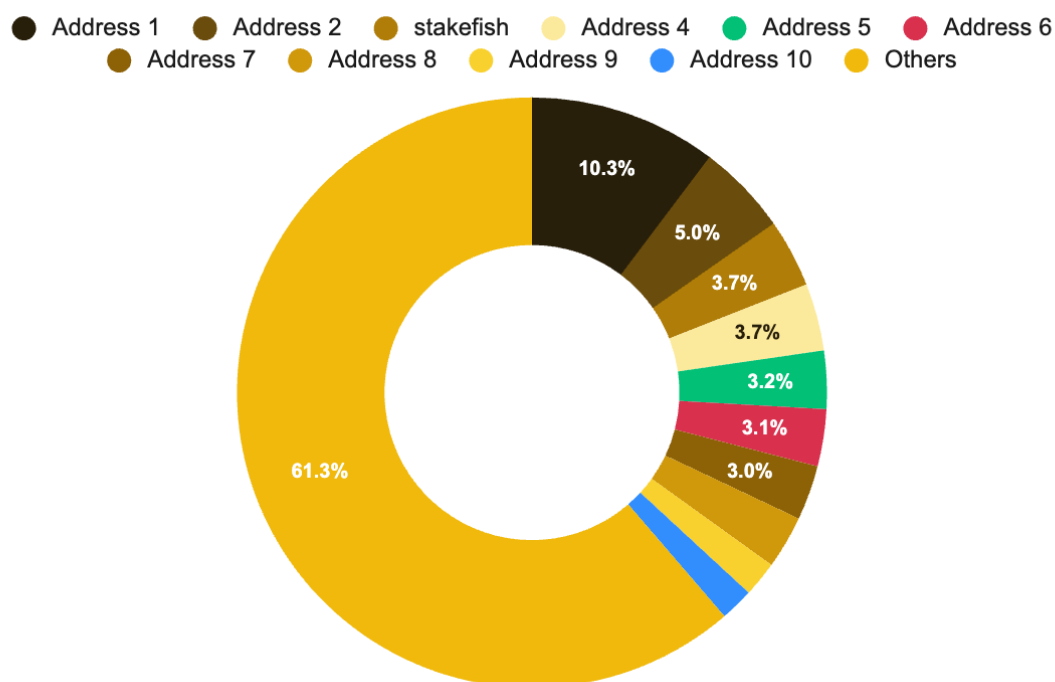
Source: Dune Analytics (@sankin), Binance Research, as of June 30, 2023

Although still in its infancy and facing scrutiny for potential systematic risks to Ethereum, including from influential figures such as Vitalik Buterin[115], restaking has nonetheless begun to establish itself as an intriguing theme within the DeFi space. The realization of this trend will ultimately hinge upon successfully addressing these systemic risks, underscoring the critical role of proactive risk management in the domain of blockchain security. As we navigate through the second half of the year, it will undoubtedly be interesting to track restaking's development and the innovative ways in which it might shape the economy of staking and blockchain security.

To gain further insights into liquid staking, we recommend referring to our report, Data Insights: Liquid Staking and LSDFi Heat Up.

6.3 Decentralized Exchanges

Into 2023, DEXes continue to play a critical role within the DeFi landscape, despite experiencing a minor reduction in market share. These platforms, leveraging smart contracts to facilitate crypto transactions in the absence of intermediaries, remain true to the fundamental ethos of DeFi. **While fluctuations in market dominance were noted, the sector still managed to witness modest TVL growth, rising from US$14.8B to US$15.7B.**

Since the start of the year, Uniswap has seen a steady 18.1% increase, outpacing Curve Finance and securing its position as the largest DEX by TVL. Curve Finance, while also experiencing growth, has seen a more subdued increase of 2.8% during the same period. **Uniswap's announcement and anticipated launch of v4 put it in a strong position to not only maintain its lead but also further extend its dominance.** This new version is expected to help Uniswap attract more flow from DEX aggregators, accommodate a broader array of exotic trading pairs, and strengthen its standing among high-volume pairs.

Uniswap v4 could be a defining moment for the DEX sector, especially if it successfully manages to attract a diverse set of traders by introducing more complex order types, such as time-weighted average price ("TWAP") and limit orders[116]. With regulatory pressure pushing more traders towards on-chain operations, DEXs like Uniswap could significantly benefit and further extend the DEX to CEX trading volume ratios. **What's more, the nature of the v4 upgrade showcases the increasing shift towards open-source and public infrastructure - a trend already prominent in the L1/L2 space and now extending its reach into DeFi.** With its enhanced customizability, Uniswap v4 could enable project teams to build on top of Uniswap's secure and liquid base[117], thereby transforming Uniswap into a foundational layer for future automated market makers ("AMMs").

Figure 54: Since the onset of this year, Uniswap has surpassed Curve Finance to become the largest DEX with a TVL of US$3.9B, while PancakeSwap's TVL has concurrently decreased to US$1.5B
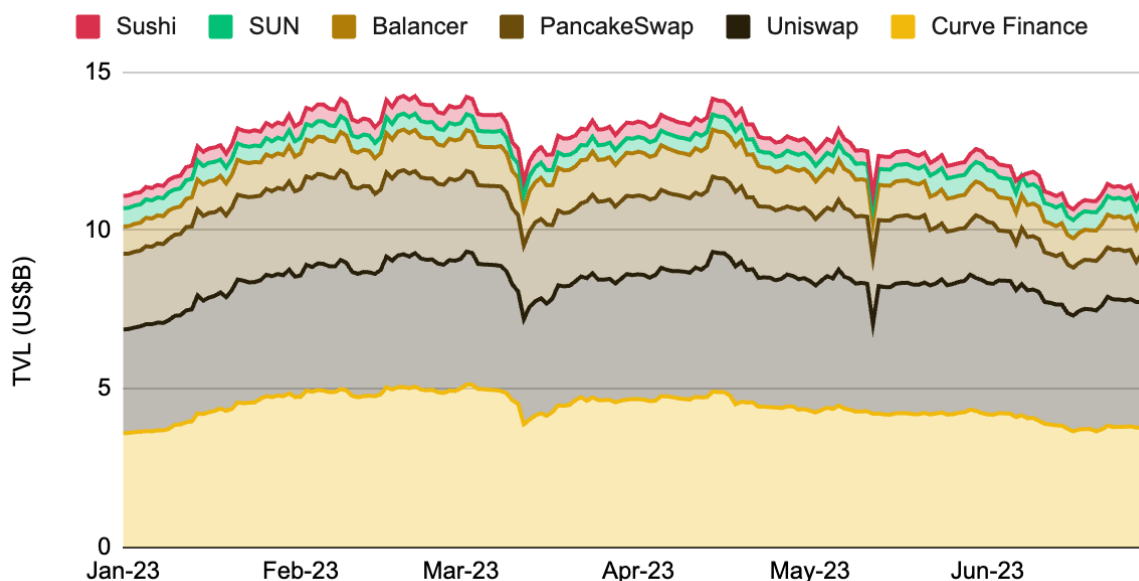
Source: DeFiLlama, Binance Research, as of June 30, 2023

Another significant change in the DEX landscape is the decrease in PancakeSwap's TVL, largely due to capital outflows on BNB Chain. While other protocols on BNB Chain, such as Venus and Alpaca Finance, were affected too, it was PancakeSwap that faced the most substantial setback. **Despite retaining third place, PancakeSwap has seen a reduction of approximately US$900M in its TVL, marking a significant 37.5% decline YTD.**

Naturally, aside from TVL, trading volumes also serve as a significant measure to evaluate the performance of DEXes. Uniswap remains the undeniable leader in the DEX space, commanding the majority of the market's trading volumes. **Surprisingly, the impact on PancakeSwap's TVL hasn't translated into reduced trading activity, as it achieved a remarkable 25.5% market share in June**. Much of PancakeSwap's growth in trading volumes is likely attributed to the introduction of a concentrated liquidity model through its V3 upgrade earlier in the year, raising its attractiveness for liquidity providers.

On the other hand, SushiSwap experienced a decline in trading activity, with its trading volume falling to just US$25.4M after witnessing increased activity leading up to March of this year. A notable absentee from Figure 55 below is SUN, which registered a lower trading volume of only US$7.3M, indicating that its high TVL has not translated into increased activity on the Tron-based DEX. **Meanwhile, Maverick Protocol emerged as a new player, capturing 1.4% of the trading volume from the established incumbents.** These dynamics demonstrate the ever-evolving nature of the DEX market and the potential for

emerging protocols to challenge the status quo through the creation of innovative product-market fits.

Figure 55: Uniswap dominates the DEX trading volume landscape with over 60% market share, while PancakeSwap remains a significant player at 15.8%
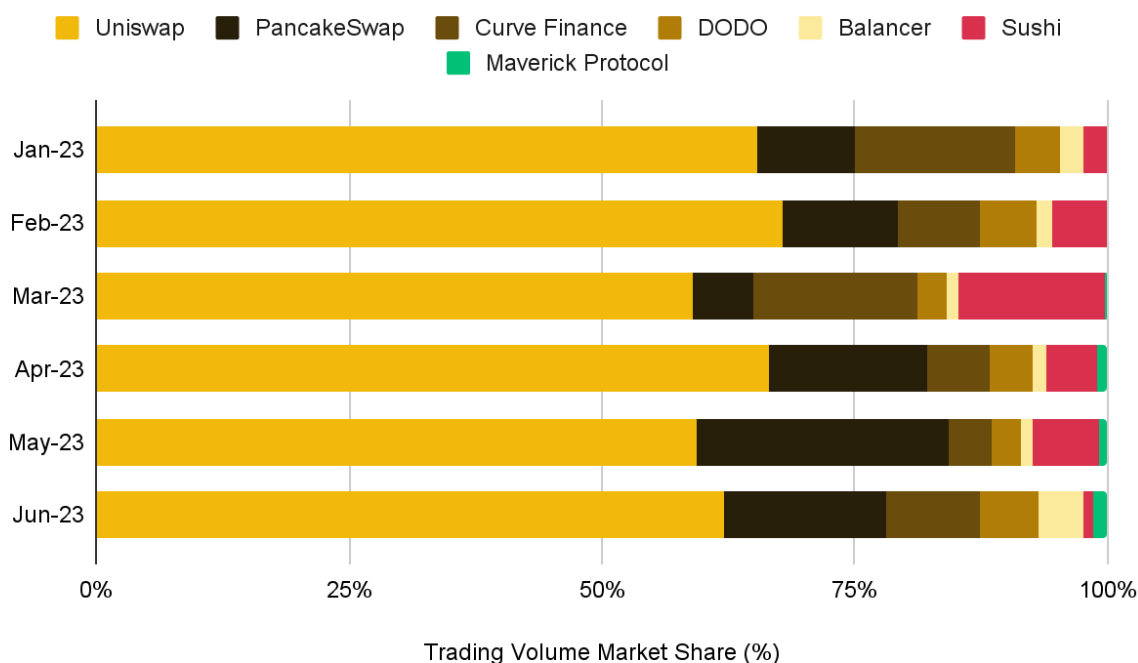
Please note that the figure displays the market share distribution solely for the protocols considered.
Source: Dune Analytics (@hagaetc), Binance Research, as of June 30, 2023

Since its inception in March, Maverick Protocol has swiftly ascended to the top-tier of DEXes in terms of trading volume, amassing a TVL of US$44.9M[118]. The protocol has earned the reputation of being one of the fastest-growing DEXes this year. Maverick differentiates itself in the crowded DEX market through the following[119]:

◆ **Dynamic AMM:** This unique feature enables liquidity providers to increase their fee capture via a customized liquidity distribution tool. Liquidity providers can automate their distribution range and predict the liquidity pool assets' future prices, resulting in enhanced capital efficiency.

◆ **Leader in LST trading:** Maverick surpasses competitors like Uniswap, Curve, Balancer, and others in LST trading volume. Its dynamic AMM is ideally suited for LST-ETH pairs, and it supports a wide array of LSTs, such as wstETH, frxETH, swETH, rETH, and cbETH, expanding its market reach and catering to a wider user base.

6.4 Lending

As illustrated in Figure 48 earlier, the growth of liquid staking has had a nominal impact on the market share of lending, underscoring the sector's robustness amidst significant market transitions. **Today, lending stands as a vital component of DeFi, with a TVL of US$14.5B**[120]. With the average value of active loans on the rise, this sector has witnessed several key developments as we transcend the first half of the year.

Upon examining the market's lending protocols, Ethereum's Aave emerged as the clear front-runner, boasting a TVL of US$5.6B[121], nearly double the value of its closest competitors. **Despite Aave's dominance, H1 2023 saw JustLend continue to make significant strides, adeptly capitalizing on the growing activity in Tron's stablecoin market.** After having surpassed Compound Finance last year, JustLend successfully retained its standing as the second-largest lending protocol into the current period as well. This achievement is certainly an interesting development, especially for the Tron ecosystem in its ongoing pursuit towards enhanced stability and harnessing additional use cases.

While the remainder of the market is comparatively smaller, it nonetheless holds a noteworthy presence with players such as Venus, Morpho, and Arbitrum's Radiant Capital. **In particular, Radiant Capital's v2 launch attracted significant attention and emerged as the largest gainer this year.** It experienced a ten-fold surge, propelling its TVL to over US$250M today, though its long-term impact remains to be seen[122]. **Nevertheless, this serves as a notable example of the emerging trend of DeFi protocols leveraging the rapidly expanding L2 ecosystem to commoditize the performance dimension when competing with other protocols**.

However, a critical and organic measure in the analysis of DeFi lending involves assessing the number of active loans across various protocols. This approach provides a more comprehensive view of the competitive landscape and its activity within the lending ecosystem.

As seen in Figure 56 below, Aave outperforms in the lending space, not just by the measure of TVL but also through the value of active loans. Interestingly, even though JustLend on the Tron network boasts a higher TVL, it's Compound Finance that demonstrates more efficient capital utilization within its ecosystem. There exists a considerable gap between JustLend's TVL and its average daily value of active loans, suggesting that much of the capital is effectively dormant within the protocol, potentially being used for custodial purposes and not actively leveraged or utilized.

Figure 56: The average daily value of active loans increased by 25.6% YTD, with Aave maintaining dominance at US$2.8B and notable growth observed in Morpho and Radiant Capital
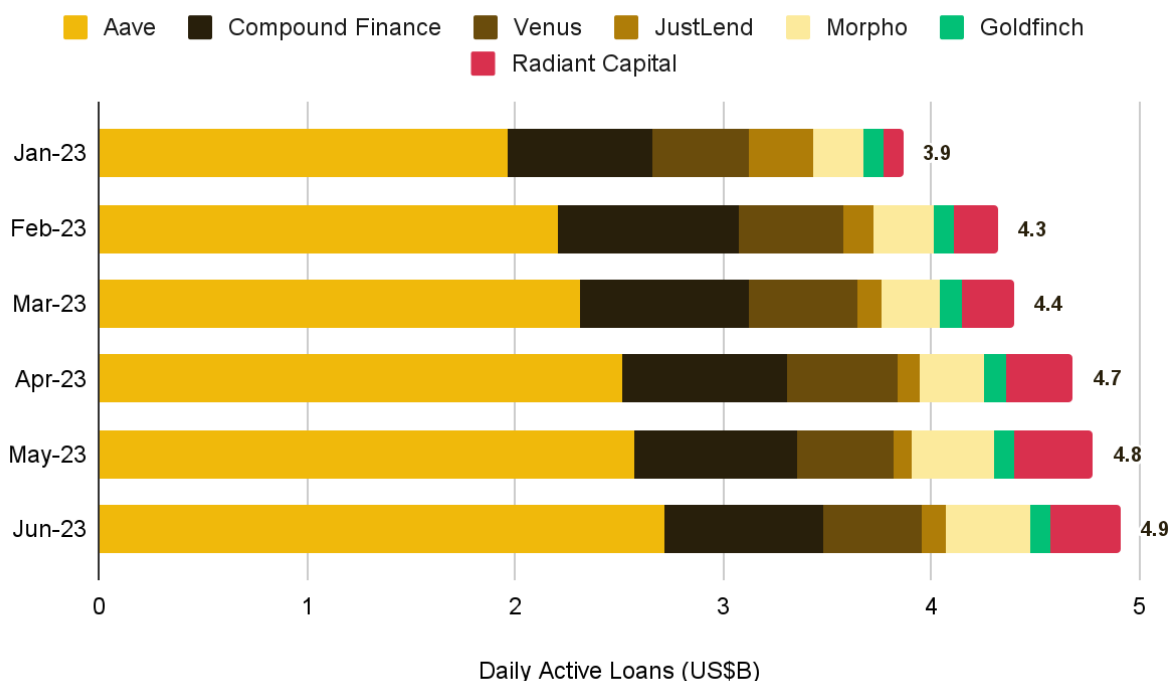
Source: DeFiLlama, Token Terminal, Binance Research, as of June 30, 2023

The value present in the lending products of Morpho and Radiant Capital underpins their respective growths, thus infusing more substance into their recent increases in TVL. Goldfinch, on the other hand, marks its place in the lending ecosystem by operating a distinct model. **Despite its relatively lower TVL of US$1.6M[123], Goldfinch exhibits an astonishingly high value of active loans surpassing US$100M, effectively positioning the protocol on the same playing field as some of the traditional lenders**. This is largely due to its approach of offering fully collateralized off-chain loans that are backed by RWAs[124]. The model doesn't rely on over-collateralization with crypto assets but enables borrowers to demonstrate creditworthiness based on the collective assessment of other participants, allowing for the underwriting of loans that are instead under-collateralized.

Goldfinch's emphasis on under-collateralized loans and the creation of infrastructure for emerging markets could potentially carve out a unique customer niche for the protocol[125]. **Goldfinch's performance underscores the potential of integrating real-world lending within blockchain networks, thus broadening the scope of DeFi beyond crypto-native activities**. As other undercollateralized solutions like RociFi, TrueFi, and Atlendis enter the market, this narrative is certainly one to watch moving forward.

Another intriguing trend over the last few months has been the merging of lending platforms and stablecoin providers, showcasing a convergence that augments the utility and functionality of these DeFi categories. Notable examples include Aave's GHO, Frax's Fraxlend, and more recently, MakerDAO's Spark protocol (a soft fork of Aave V3). These platforms aim to enhance the synergies of their respective products by providing increased liquidity and competitive borrowing and saving rates. **This development represents a key example of the increasing interoperability in the DeFi space, paving the way for future innovation and cross-functional solutions**.

6.5 Derivatives

Despite being in its early stages and accounting for only about 1.4% of the total DeFi TVL, the decentralized derivatives market has expanded its scope during the first half of 2023, now encompassing a multitude of projects across various sectors. In fact, it has become the eighth largest category in DeFi and is witnessing increased exposure as the industry narrative continues to shift from CEXes to DEXes[126]. Derivatives have gained popularity due to their inherent leverage, with examples such as perpetual contracts and options contracts providing users with significant leverage, reaching up to 50x on particular trading venues.

In today's market, crypto-native perpetual futures unquestionably dominate, contributing over 92% to derivatives TVL. Their popularity in decentralized markets comes as no surprise, given their strong presence in CEXes. Perpetual futures are also comparatively easier to implement within a decentralized framework, unlike other derivative products. While options-based protocols have experienced some growth, it is evident that DeFi markets have placed a strong emphasis on perpetuals, though noteworthy innovations have also been witnessed in other sectors such as fixed yield, interest rate swaps, option vaults, and structured products.

Figure 57: Perpetual futures reign supreme in DeFi's derivatives economy, accounting for over 92.1% of TVL
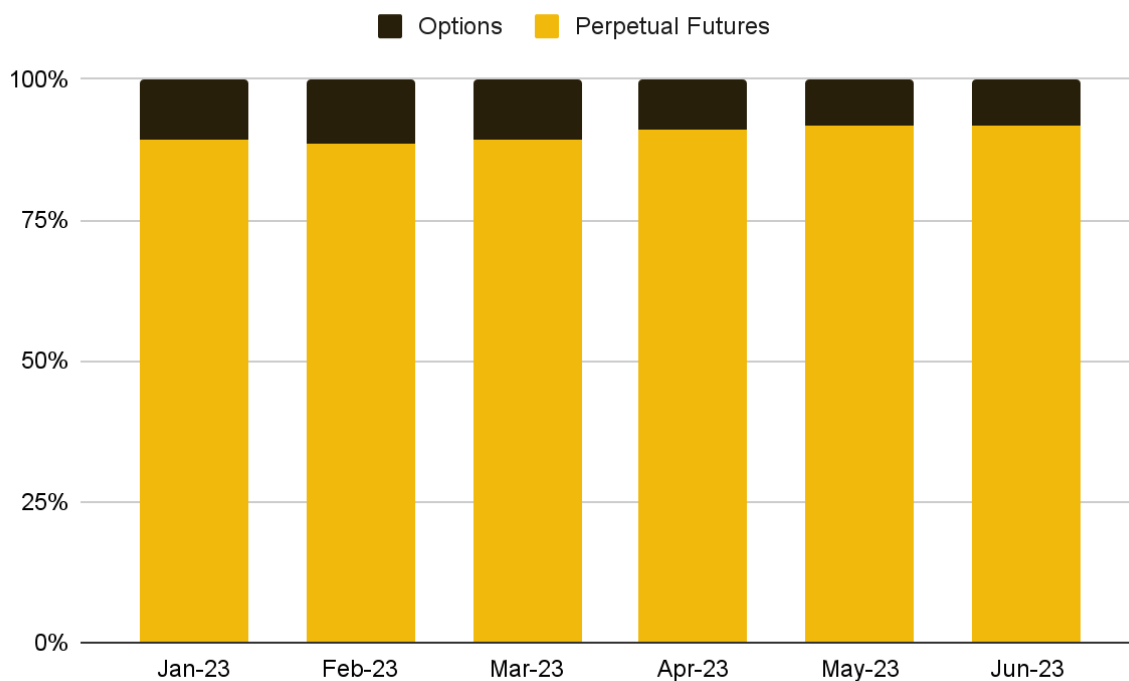
Source: DeFiLlama, Binance Research, as of June 30, 2023

Perpetual Futures

The dominance of perpetual futures owes much to the continued achievements of dYdX and GMX. As shown in Figure 58 below, among the top five protocols ranked by TVL, GMX leads with an impressive $587.4M. GMX's consistent growth, marked by a 30.4% YTD increase, has seemingly come at the expense of its main rival, dYdX, which recorded a 10.5% YTD decrease during the first half of the year.

To regain its footing, dYdX is gearing up to launch a new version, dYdX v4, in Q4 of this year[127]. Despite GMX's lead in TVL, it lags behind dYdX in daily trading volumes, reporting $378M versus dYdX's $1.9B as of June's end[128]. This indicates that while GMX has successfully drawn in capital, its trading activity has yet to match that of dYdX.

Meanwhile, Gains Network, MUX Protocol, and ApolloX have each demonstrated substantial growth, with each increasing more than twofold since the beginning of the year. MUX Protocol stands out particularly, exhibiting an exceptional growth trajectory and earning the title of one of H1 2023's highest-growth derivatives protocols, having expanded its TVL by a staggering 1307.9% YTD, a trend that shows no sign of slowing. In a space that's dominated by the 'big two,' the success of these additional protocols underscores the strong propensity of the market to welcome and engage with newer innovations.

Figure 58: GMX and dYdX remain at the forefront, commanding a combined US$940.5M of perpetual futures TVL
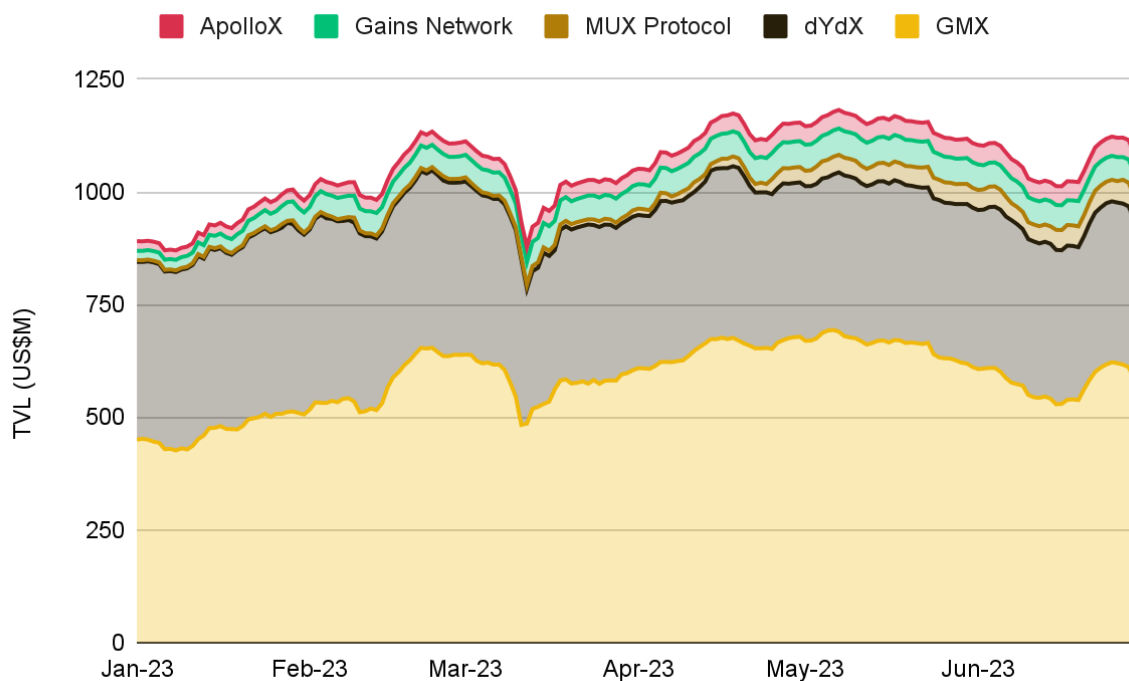
Source: Token Terminal, Binance Research, as of June 30, 2023

Options

Options, as a relatively recent entrant, comprise a smaller portion of the prevailing derivatives market. **While perpetual trading has gained popularity, options trading is gradually gaining traction, as evidenced by the growing number of innovative protocols joining the options space**. Despite its nascent status, this sector undoubtedly harbors vast potential for expansion, and it is possible that options will achieve greater adoption with the rise of a new narrative in Options-powered DeFi ("OpFi").

In a market once solely dominated by Opyn, Lyra has now emerged as the frontrunner, boasting a TVL of US$27.0M and surpassing Opyn with a remarkable YTD growth of 123.1%. Lyra's ascent has surpassed much of Opyn's previous lead and momentum established during the early phases of 2022[129]. While Dopex has maintained relative stability and experienced a minor gain since the beginning of the year, Opyn has witnessed a substantial downturn in its TVL, falling 52.7% YTD.

Simultaneously, Hegic experienced positive momentum during the first quarter of the year, though this growth has slowed down in recent months. Ribbon Finance's Aevo, on the other hand, has achieved notable success within a short time frame since its launch in April[130], propelling Ribbon Finance into the top six. What's more, Ribbon Finance asserts a

significant influence in the emerging options vault sector as well, successfully drawing the majority of capital towards its structured product. **With the options market currently characterized by a relatively lower amount of capital, further dynamic shifts are anticipated throughout the remainder of the year as protocols compete to establish themselves as mainstays in a market that is still finding its place within DeFi.**

Figure 59: During H1 2023, Lyra advanced from a TVL of US$12.1M to claim the leading position with US$27.0M, showcasing its growth in a developing options space
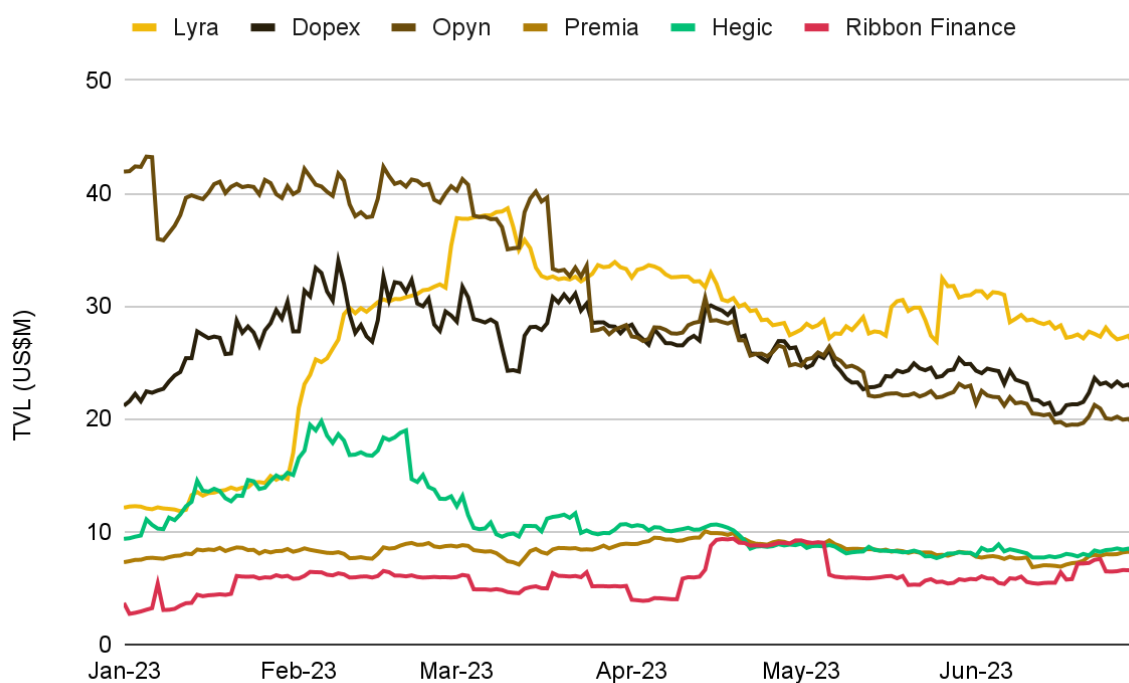
Closing Thoughts

Ultimately, DeFi is expected to play an increasingly prominent role in the cryptocurrency space as it addresses the challenge of endogenous liquidity crunches observed in CEXes while simultaneously expanding consumer-focused dApps that unlock a plethora of use cases with a strong product-market fit. Recent events have undoubtedly sparked a ripple effect, leading to the emergence of several new DeFi trends.

Looking ahead, we anticipate these emerging trends to firmly establish their position in the DeFi landscape. This includes the on-going development of liquid staking and its use cases, increased migration towards DEXes, greater adoption for real-world assets on the blockchain, advancements in derivatives products, growing interest in non-custodial dApps, and the utilization of new DeFi scaling solutions in L2 rollups and appchains.

7 Non-Fungible Tokens

Non-fungible tokens ("NFTs") have had a challenging 2023 thus far, with NFT sales peaking at the start of the year followed by a general reduction in activity over the past few months. A sideways crypto market, coupled with a decline in interest among market participants, has posed headwinds for the NFT market.

Nonetheless, we have observed pockets of growth and areas of development in the space as developers continue building. This is positive for the long-run, and we will touch on some of these developments in the subsequent section.

7.1 Market Review

NFTs recorded US$5.3B in sales volume in the first half of 2023, representing a **decline of 75.9% on a year-on-year basis but an increase of 32.9% when compared to the second half of 2022.** The jarring year-on-year decline is hardly surprising when considering the change in market sentiment from a year ago. On a brighter note, there are some signs of stabilization when comparing NFT sales in H1 2023 to H2 2022.

Figure 60: H1 2023 NFT sales have fallen on a year-on-year basis but have shown some signs of stabilization
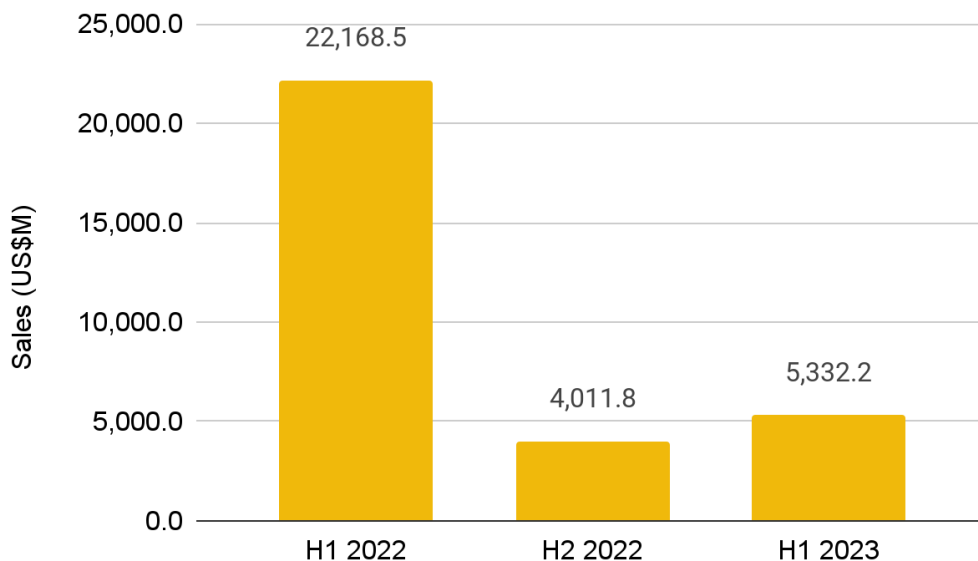
Source: CryptoSlam, Binance Research, as of June 30, 2023

Monthly NFT sales data provides additional granularity. **Sales were elevated in Q1 but declined after peaking in February.** This is likely contributed to by the BLUR airdrop in the earlier part of the year, as trading activity on the Blur marketplace surged. As a recap, Blur incentivized usage of its NFT marketplace by stipulating certain conditions that would allow users to qualify for "care packages," which would later translate into BLUR tokens. The first airdrop occurred in February, which coincided with the peak in NFT sales.

Figure 61: Sales were front-loaded in Q1, contributed by heightened activity due to the Blur marketplace

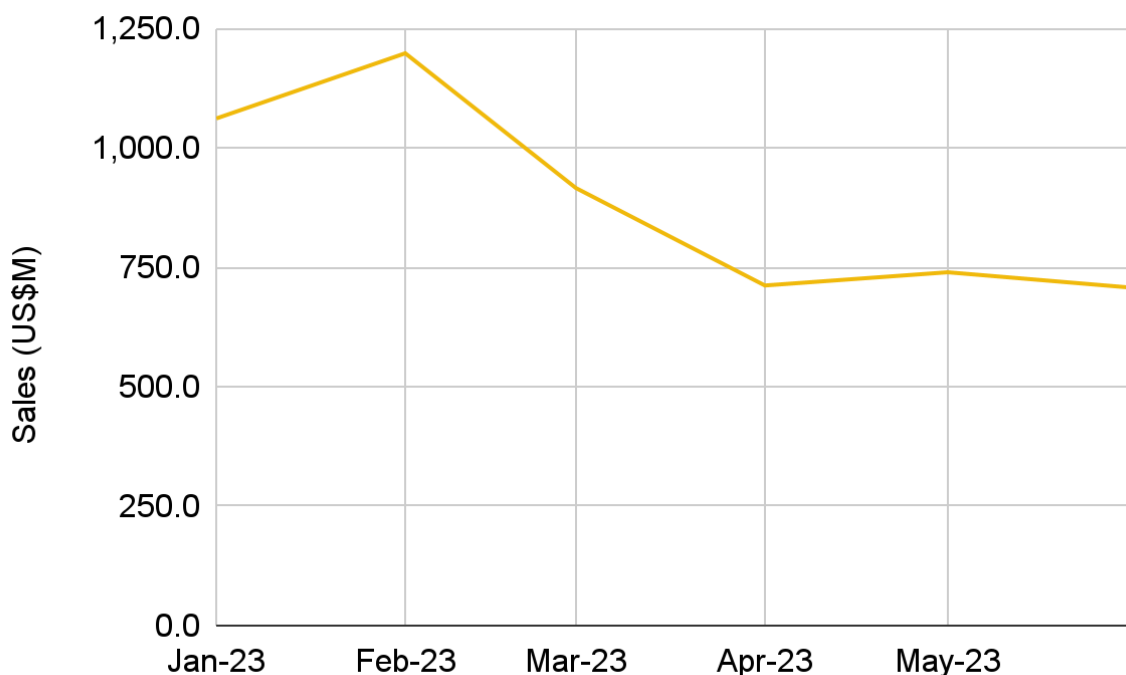Underlying drivers of NFT sales paint a sanguine picture, especially when looking at different time periods. The **sharp fall in NFT sales in H1 2023 compared to H1 2022 was largely contributed by a steep decline in average NFT sale prices (-74.9%).** While NFT floor prices have undoubtedly been down, the general decline of crypto token prices has also had an impact on NFT sale prices given that NFTs are predominantly denominated in cryptocurrencies.

Nonetheless, there have been some improvements in the underlying metrics. Specifically, **transaction volume has picked up on both a half-on-half ("HoH") and YoY basis.** The total number of transactions on a HoH and YoY basis is 41.8% and 0.6% higher, respectively. We note that this could have been contributed by inorganic volumes due to Blur's airdrop (more on this later), especially when considering that the number of unique buyers had fallen. This implies that there are more transactions executed per buyer (potentially a sign of airdrop farming).

Figure 62: Total transactions and number of unique buyers rebounded in H1 2023

Legend: Unique Buyers (Monthly Average) · Total Transactions · Average Sales (USD)

	1H 2022	2H 2022	1H 2023
Total Transactions	50,581,354	35,890,437	50,880,149
Unique Buyers (Monthly Average)	1,044,768	647,316	405,873
Average Sales (USD)	$424	$114	$107
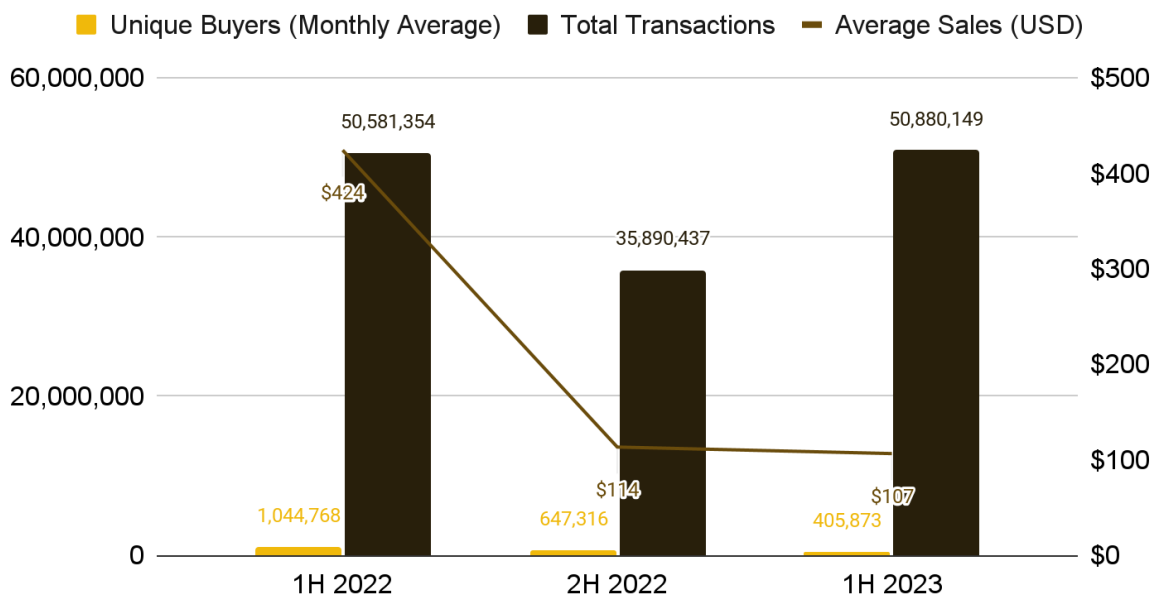
NFTs declined by roughly 45.6% in ETH terms in the first half of 2023, as measured by the Nansen NFT-500 index.

Looking at performance by sector, while every sector is in red, art NFTs performed the best, whereas gaming and Metaverse NFTs performed the worst.

Figure 63: All sectors are down year-to-date

Sector	1H2023 Performance
Blue Chip-10	-39%
Social-100	-46%
Gaming-50	-51%
Art-20	-37%
Metaverse-20	-50%
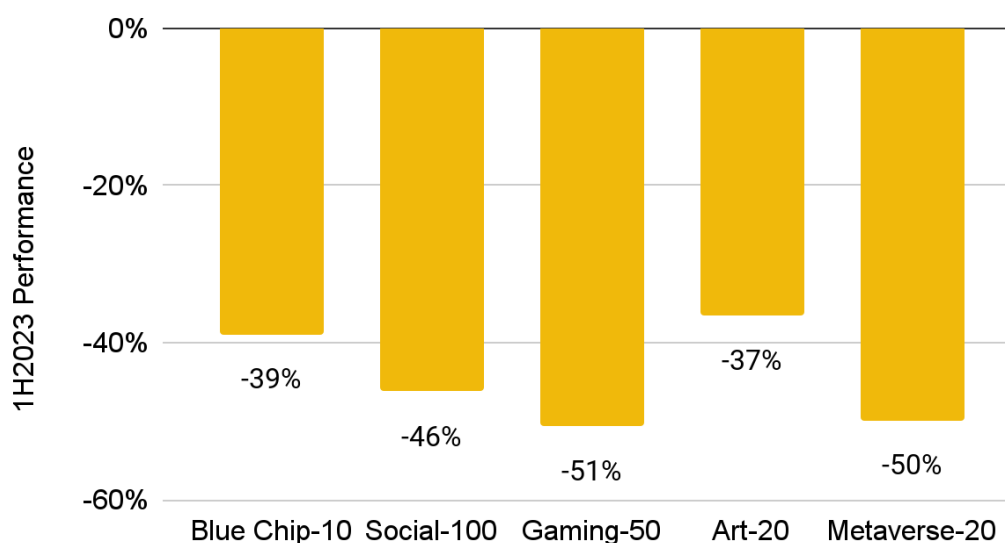
Retail interest has waned. Using Google Trends as a proxy, interest in NFTs peaked at the start of the year and has been steadily declining. This is a reflection of the challenging environment and indicates that it may still take some time before a new wave of traders enters the market. Referring to Figure 62, the average monthly number of unique buyers in H1 2023 is still 61.2% below that of H1 2022.

Figure 64: Google search interest of Non-Fungible Tokens has declined steadily
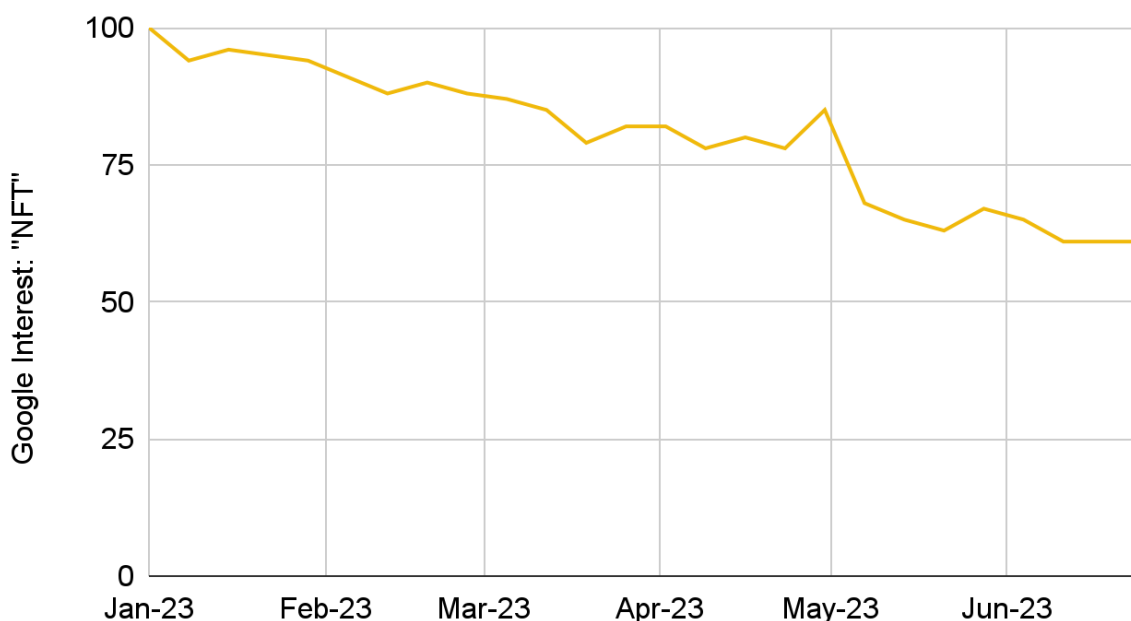
Source: Google, Binance Research, as of June 30, 2023

(7.2) NFT Marketplace Competition

Since the launch of the Blur NFT marketplace in October 2022, the platform has seen tremendous growth, overtaking OpenSea to be the largest NFT marketplace by trading volume in December 2022. **Today, Blur continues to hold the top spot with 77.2% as of the end of June 2023.**

Blur's focus on professional traders, airdrop incentives, and comprehensive trading tools have driven adoption and helped catapult the platform to the top. Check out our previous report on "The State of NFT Marketplaces," where we covered the rise of Blur in more detail.

Figure 65: Market share of NFT marketplaces on Ethereum
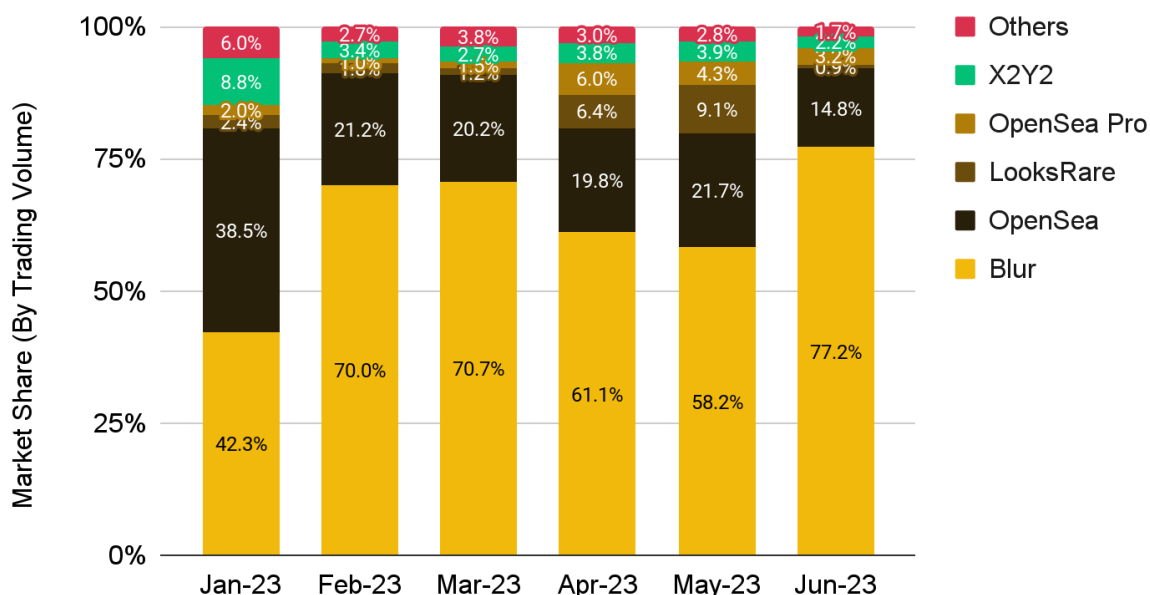
Source: Dune Analytics (@hildobby), Binance Research, as of June 30, 2023

OpenSea Pro - OpenSea's Response to Blur

The race is far from over. Referring to Figure 65, while Blur continues to hold a sizable lead, the competitive landscape is dynamic. Blur's market share peaked during the period of Blur's first airdrop before declining subsequently in April and May. Conversely, OpenSea Pro (previously Gem) and LooksRare gained some ground during that same period at the expense of Blur. Coinciding with the decline in Blur's market share, April marked the official launch of OpenSea Pro, which is OpenSea's response to Blur.

> **"We built OpenSea to serve a range of users – super fans, avid collectors, and crypto n00bs alike. OpenSea Pro, on the other hand, exists primarily to serve the power user community..."**
>
> — OpenSea[131]

OpenSea Pro is an NFT aggregator that offers traders the ability to discover the best deals across 170 marketplaces. Fees are similar to Blur; OpenSea Pro currently charges 0% marketplace fees and has a minimum of 0.5% creator royalties.

Figure 66: Comparison of OpenSea Pro and Blur

	OpenSea Pro	Blur
Launch Date	April 2023 (Gem Launched in Jan 2022)	October 2022
Target Audience	Pro Traders	Pro Traders
Marketplace Support	172	3
Marketplace Fees	0%	0%
Creator Royalties	0.5% Minimum	0.5% Minimum
Native Token	Not Applicable	BLUR

Source: Projects' websites, Binance Research, as of June 30, 2023

There are initial signs of increasing adoption of OpenSea Pro. While Blur still commands a higher trading volume in US dollar terms than OpenSea Pro, OpenSea Pro has consistently exceeded Blur in terms of the number of transactions on the platform. Additionally, there are also a greater number of active wallets on OpenSea Pro.

Figure 67: Transaction count on OpenSea Pro has consistently exceeded that of Blur
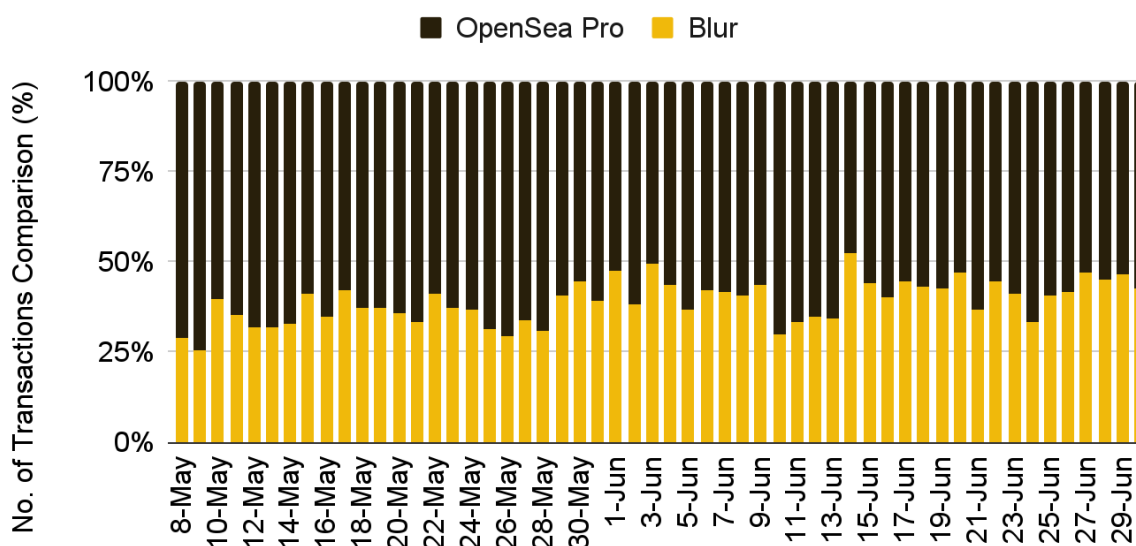
Source: Dune Analytics (@sohwak), as of June 30, 2023

Figure 68: Daily active addresses on OpenSea Pro has consistently exceeded that of Blur
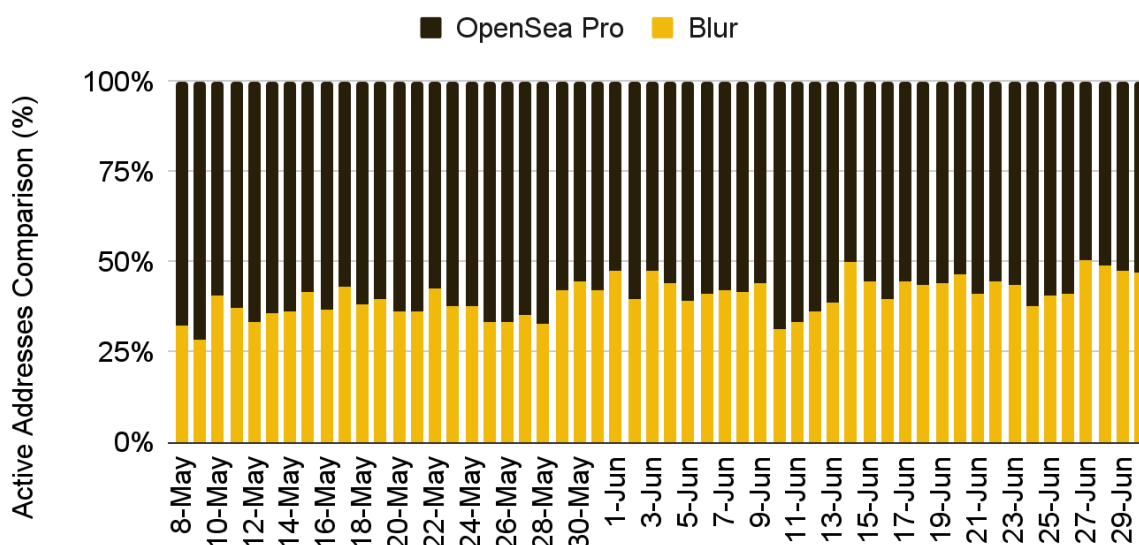
Source: Dune Analytics (@sohwak), as of June 30, 2023

Current activity on OpenSea Pro may be driven by speculation about upcoming rewards. For example, OpenSea CEO Devin Finzer has highlighted in a blog post that they are *"charting a different course by featuring NFTs as rewards."* Additionally, OpenSea Pro's website states that activity is being tracked by the platform. Altogether, some traders may have increased their activity on OpenSea Pro in anticipation of any potential rewards, although OpenSea has yet to confirm anything on this matter.

Figure 69: Screenshot of OpenSea Pro's website
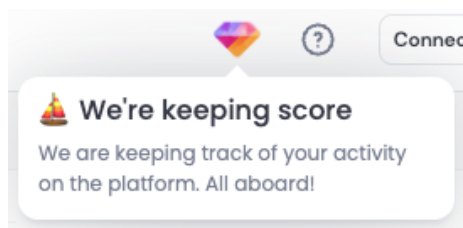
Source: OpenSea Pro

Overall, it is still too early to tell how the competitive landscape will look in the months to come, given that **current activity may be influenced by platform incentives and is likely not a true reflection of organic demand**. One thing is for sure: OpenSea and Blur are both not giving up without a fight.

NFT Lending has witnessed a resurgence in interest in recent months, coinciding with elevated NFT trading activity in Q1 and driven by the launch of Blur's lending platform, Blend, in May 2023.

Specifically, **monthly borrow volumes on NFT platforms have hit a new high** and recorded US$823M in June 2023. This growth is predominantly driven by Blend, which has become the top NFT lending platform since its launch in May.

As a recap, NFT Lending is a form of asset lending that enables NFT holders to access liquidity by securing loans using their NFTs as collateral. This is then paid back with interest over a specific period. For details on how NFT lending works and the different models, check out our prior report on The Financialization of NFTs.

Figure 70: Monthly borrowing volumes on NFT lending platforms hit a new high
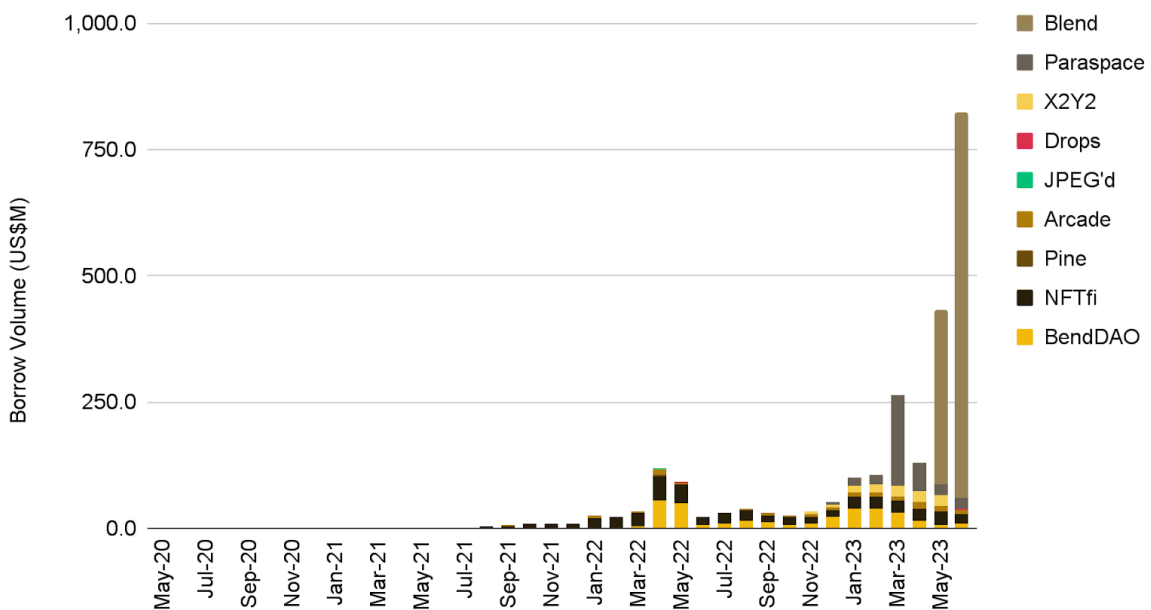
Source: Dune Analytics (@impossiblefinance), Binance Research, as of June 30, 2023

The Launch of Blend

Blend is a perpetual NFT lending protocol that launched on May 1, 2023. The concept of perpetual lending means that loans have no fixed tenors and positions are open indefinitely until liquidated at a market-determined interest rate.

Since its launch, Blend has managed to dominate the NFT lending market as lending volume has grown exponentially on its platform. Based on monthly borrowing amounts in June 2023, Blend has captured 92.8% of the lending market, significantly eclipsing every other player in the space.

Figure 71: Market share by monthly borrow volumes

Others
2.3%
Paraspace
2.4%
NFTfi
2.6%

Blend
92.8%

However, it is key to note that **lending activity on Blend may be inflated by airdrop farming and, hence, is likely not 100% representative of organic demand**. For context, users can earn points for participating in lending activities on Blend, which would contribute to their eligibility for Blur's Season 2 airdrop. Nonetheless, it is undeniable that Blend's rise has been impressive considering that the platform has barely been live for two months.

7.4 The Rise of Bitcoin NFTs

Bitcoin NFTs, and specifically, Ordinals, have been the talk of the town in the first quarter of 2023. It represents an interesting innovation and spurred intense discussion among the Bitcoin community as it drove significant demand for blockspace, resulting in higher fees.

As a recap, ORD, an open-source software that can run on top of any Bitcoin full node, enables the tracking of individual Satoshis based on what founder Casey Rodarmor termed "Ordinal Theory". Ordinal Theory ascribes a unique identifier to every single sat on Bitcoin. Furthermore, these individual sats can be "inscribed" with arbitrary content such as text,

images, or video to create an "Inscription," i.e., a Bitcoin-native digital artifact, or what can also be called a NFT.

Bitcoin NFTs came about in December 2022, when the first Ordinal Inscription was minted.

Figure 72: The first Bitcoin Inscription; Inscription 0 (Dec 14 2022)

Source: ordinals.com

To date, over 14.4M Inscriptions have been minted on the Bitcoin blockchain, with daily Inscriptions reaching a record high of 400K in May. While there are signs of tapering growth, activity remains relatively elevated at an average of more than approximately 100K daily Inscriptions in June 2023.

Figure 73: There have been over 13.3M inscriptions minted on the Bitcoin blockchain
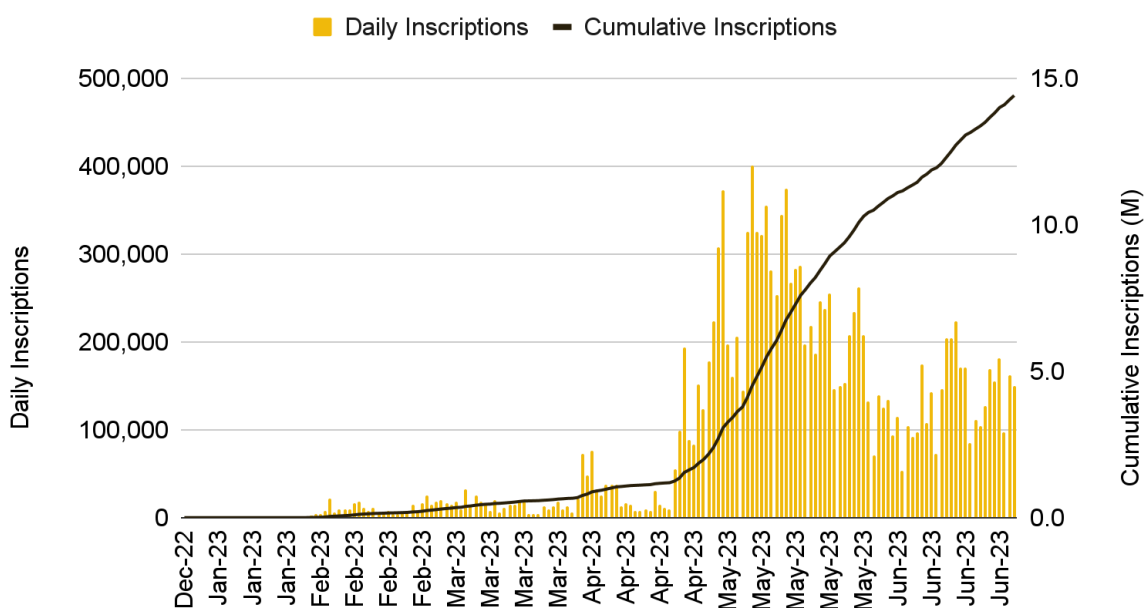
Source: Dune Analytics (@dgtl_assets), as of June 30, 2023

Initial usage of Ordinals centered around image-based NFTs; these are similar to the profile picture NFTs that many are familiar with, or what is shown above in Figure 72. However, the

launch of a new BRC-20 standard in March 2023 has resulted in significant growth of BRC-20-related Inscriptions and accounted for the bulk of Bitcoin Inscriptions in recent months. **BRC-20 is an experimental token standard that enables the minting and transfer of fungible tokens via the Ordinals protocol** on the Bitcoin blockchain.

Figure 74: BRC-20 Inscriptions have surpassed image-based Inscriptions in recent months
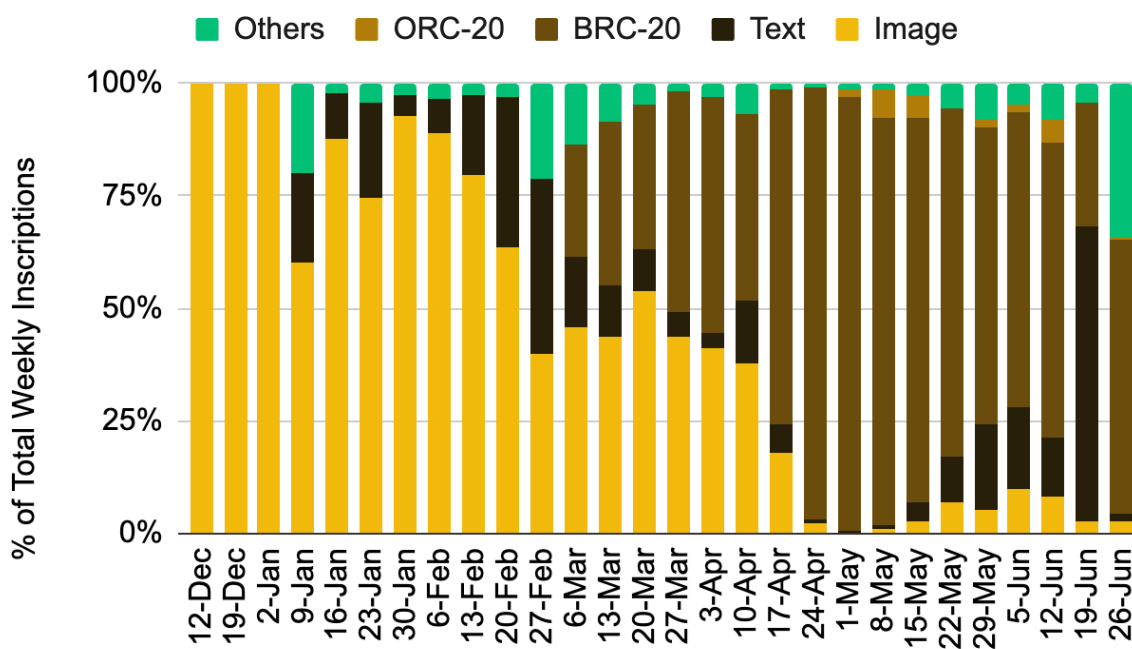
Source: Dune Analytics (@data_always), as of June 30, 2023

As evident in Figure 74, the growth of Inscriptions has largely been driven by BRC-20-related tokens, which are fungible in nature. On the other hand, NFT-like Inscriptions have been experiencing relatively muted growth, demonstrating that interest in them is comparatively lower.

Figure 75: Non-BRC-20 and Non-ORC-20 tokens have grown, but at a slower pace

Legend: ■ Others ■ Text ■ Image

Y-axis: No. of Weekly Inscriptions (0 to 500,000)

X-axis: 12-Dec, 2-Jan, 16-Jan, 30-Jan, 13-Feb, 27-Feb, 13-Mar, 27-Mar, 10-Apr, 24-Apr, 8-May, 22-May, 5-Jun, 19-Jun

Source: Dune Analytics (@data_always), as of June 30, 2023

When one thinks about NFTs today, NFTs on Ethereum typically come to mind given the size of the ecosystem. However, there are interesting differences between Bitcoin Inscriptions and Ethereum NFTs that, in some instances, may make sense for creators to consider minting their collections on Bitcoin.

- ◆ **Fully on-chain:** Inscriptions are directly stored on the Bitcoin L1 chain. A common criticism of the most popular group of NFTs, i.e., ERC-721 NFTs, is that the metadata for many of them is stored off-chain on platforms like IPFS, Arweave, or sometimes fully centralized Web2 servers. These solutions may not be fully reliable and are dependent on external factors to continue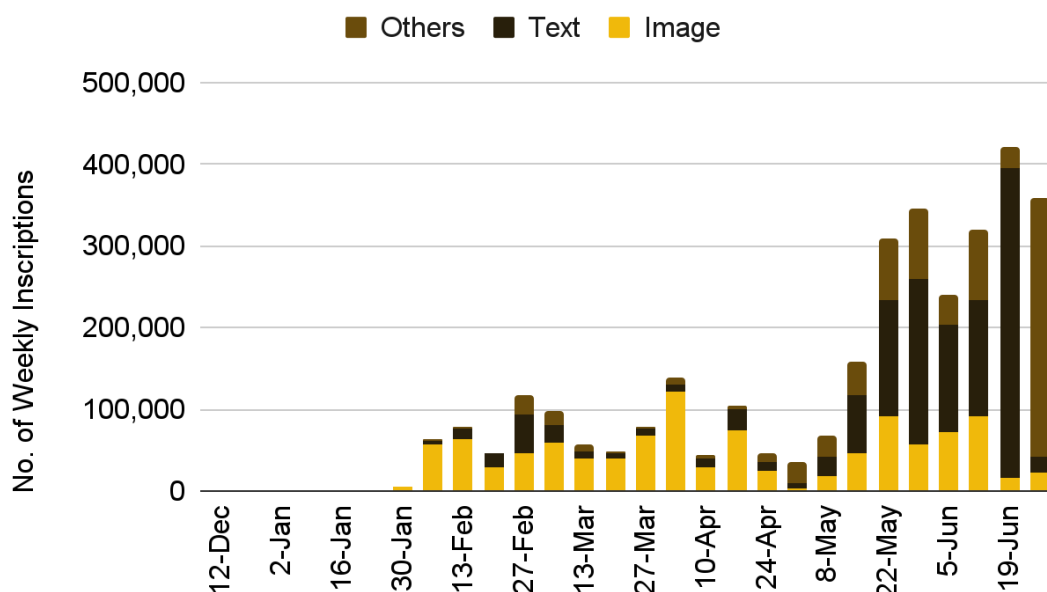 existing. On the other hand, **Inscriptions will essentially exist as long as Bitcoin exists**. This adds a layer of **permanence**, a quality that could be very attractive to collectors of many types.

- ◆ **Immutable:** Due to being stored directly on chain, Inscriptions are always guaranteed to be completely immutable. While many current NFTs are immutable, a lot of them can also be modified or deleted by the contract owner. This is simply not possible with Inscriptions and adds to their sense of permanence.

- ◆ **Ordering:** Given that Inscriptions are inscribed onto individuals sats using Ordinal Theory, it means that each Inscription is technically ordered. There is a 500th Inscription, a 9999th one, and so on. This is a unique feature to most current types of NFTs and adds a different level of value; another feature that could be very appealing to collectors, e.g., those collecting sub-100k Inscriptions or the first Inscriptions after a block halving, etc.

- ◆ **Scarcity:** Through the combination of SegWit and Taproot, Bitcoin blocks can store up to 4MB of data. This puts an effective upper bound on both the size of Bitcoin Inscriptions and the number of Inscriptions that can be inscribed on Bitcoin overall, i.e., given that approximately 144 Bitcoin blocks are mined per day, if the entire 4MB space is an Inscription, that gives us roughly 210GB per year. There is no such upper limit for most general smart contract-based NFTs, which could theoretically mint unlimited amounts of NFTs.

For more details, read our report titled "A New Era for Bitcoin?"

Overall, Ordinals, Inscriptions, and BRC-20 tokens have helped to demonstrate to the world that there is indeed a demand for Bitcoin blockspace outside the classic peer-to-peer payment model. While Ethereum is largely still the dominant player within the NFT space, the enablement of NFTs on Bitcoin represents an interesting innovation for the world's most renowned blockchain.

8 Gaming and Metaverse

Compared to the hype around X-to-Earn games and Metaverses in 2021 and early 2022, retail interest in the gaming and Metaverse sectors is significantly lower today. Despite challenges in the market, the market capitalization of gaming-related tokens has seen growth, benefiting from a broader market recovery. Additionally, developers remain committed to building, understanding that quality game development is a time-consuming process that will gradually unfold. While Metaverse adoption is currently in its early stages, many institutions recognize the potential benefits it holds for the future.

8.1 State of Gaming

The gaming landscape is led by the top three blockchains. **More than 67% of games are built on BNB Chain, Ethereum, and Polygon.** Given the large number of on-chain transactions for games, blockchains that have lower gas fees have a competitive advantage.

Figure 76: BNB Chain, Ethereum, and Polygon lead the blockchain gaming market
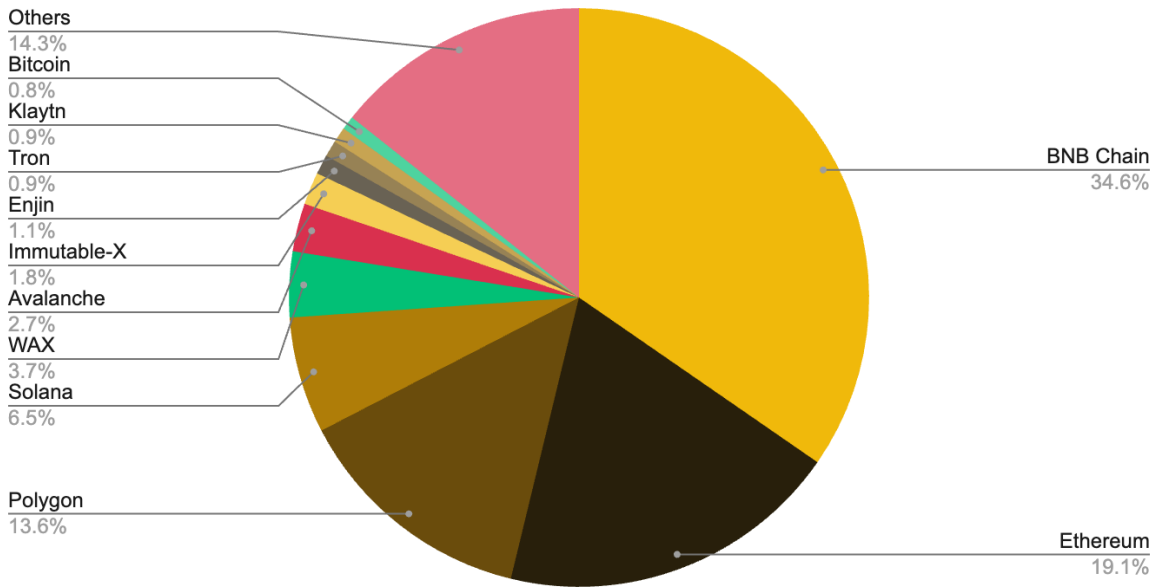
Source: PlaytoEarn.net, as of June 30, 2023

What about the status of game development? The blockchain gaming industry has often been criticized for its lack of quality games and subpar gameplay. However, **it is key to understand that AAA games take years to develop, even for the largest traditional**

gaming studios with decades of game-making experience and a strong balance sheet.
Short development cycles are not effective enough to build AAA games. Rather, developers that focus on long-term growth over short-term results may have a better shot at developing quality games.

Currently, only 27.6% of all blockchain gaming projects are live, while the rest are still in different stages of development. This timeline makes sense, given that the bulk of the funding was received in the past 1-2 years and that more games should be launched over the next couple years.

Figure 77: 27.6% of games are live today
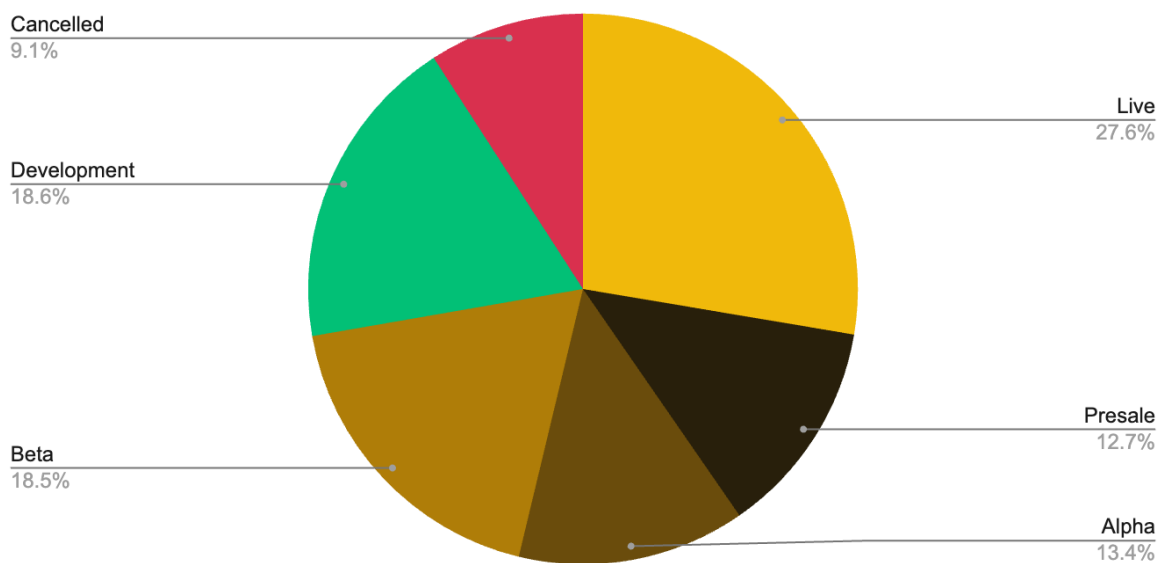
Source: PlaytoEarn.net, as of June 30, 2023

Looking at on-chain metrics, gaming activity has declined somewhat compared to the start of the year. Based on end-of-month snapshots, **weekly unique active wallets have declined steadily over the first half of the year.** There are currently 5.2M weekly unique active wallets as of the final week of June. Note that this data only represents on-chain activity, and given that not all actions on games require interactions with the blockchain, this data understates actual gaming activity.

Figure 78: Weekly unique active wallets have declined compared to the start of 2023
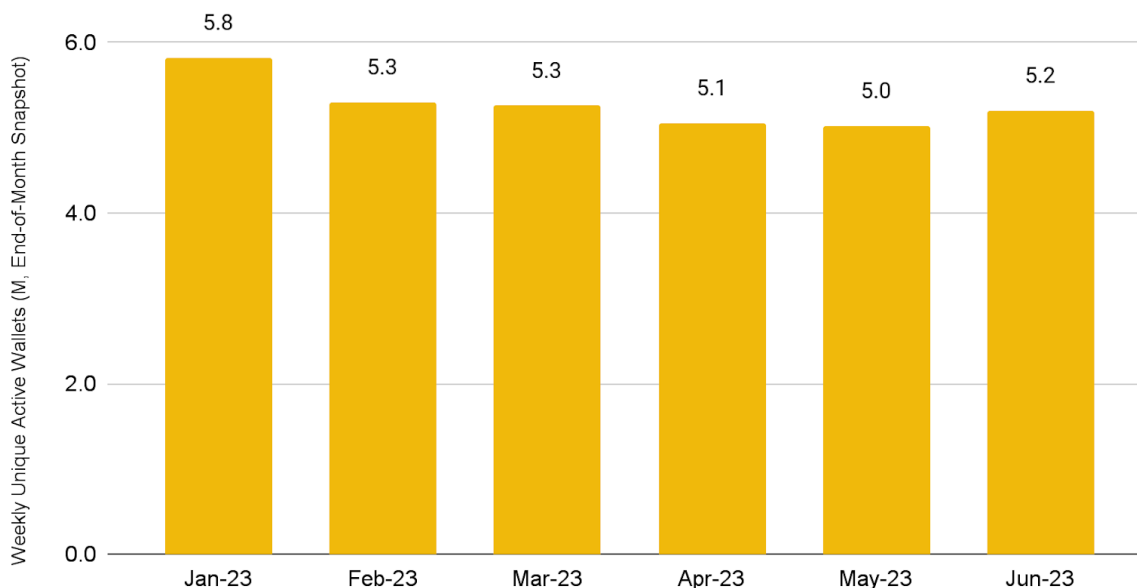
Market capitalization for gaming-related tokens increased by 48% year-to-date, ending the first half of 2023 at US$12.1B. Gaming-related tokens have benefited from the broad-based recovery in the crypto market.

Figure 79: Market capitalization of gaming-related tokens

Referring to the performances of the top 10 gaming-related tokens in Figure 80, most have had a positive run in the first half of 2023. The performances of Ronin, Gala, and Immutable X stand out. Notable developments include:

- **Ronin:** Ronin released [RON staking](#) in March and launched [Mavis Market](#), a generalized NFT marketplace, in May.
- **Gala:** Gala transitioned to GALA v2 and burned $660M worth of GALA tokens. It also upgraded its token contract to [GALA v2](#) and [burned US$660M](#) worth of GALA.
- **Immutable X:** Immutable X announced a [partnership with Polygon](#) to build its own zkEVM chain and launched the beta of its [Immutable Passport](#).

Figure 80: Price and market cap performance of gaming-related tokens in H1 2023
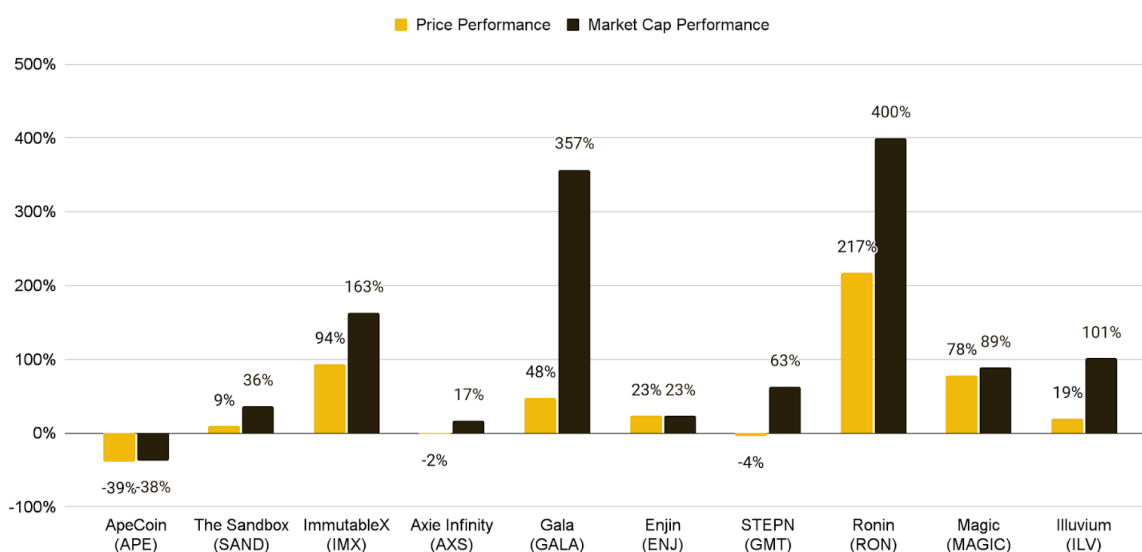
Source: Coinmarketcap, Binance Research

8.2 State of the Metaverse

Estimated to generate up to US$5T in value by 2030[132], the Metaverse is a virtual shared space that brings together physical and digital realities. Recognizing the potential the Metaverse could bring, institutions have signaled continued interest in the space. Nonetheless, the initial euphoria has undoubtedly subsided, revealing a more nuanced understanding of the challenges that lie ahead.

We note that general public interest in the Metaverse has also declined steadily over the course of the year.

Figure 81: Google search interest has fallen from its peak at the start of the year
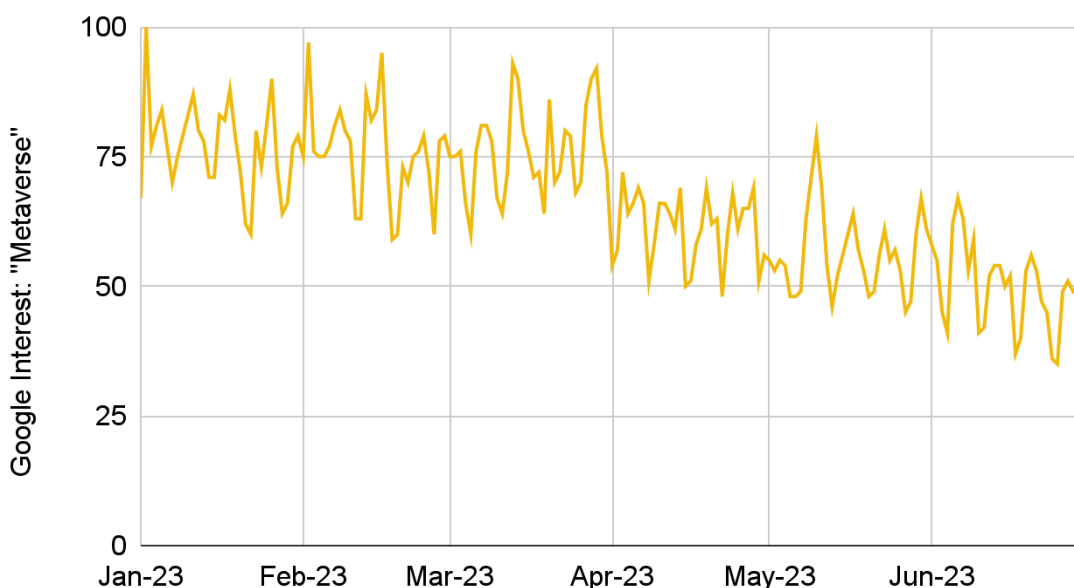
Source: Google, Binance Research, as of June 30, 2023

Alongside the decline in interest, Metaverse-related transactions and sales have also fallen significantly. Notwithstanding a surge in February and March, which coincided with heightened NFT volumes due to the Blur airdrop, the sector recorded US$6.1M in sales in June 2023, 88% lower compared to December 2022.

Figure 82: Monthly Metaverse-related sales in June 2023 was 88% lower than in December 2023
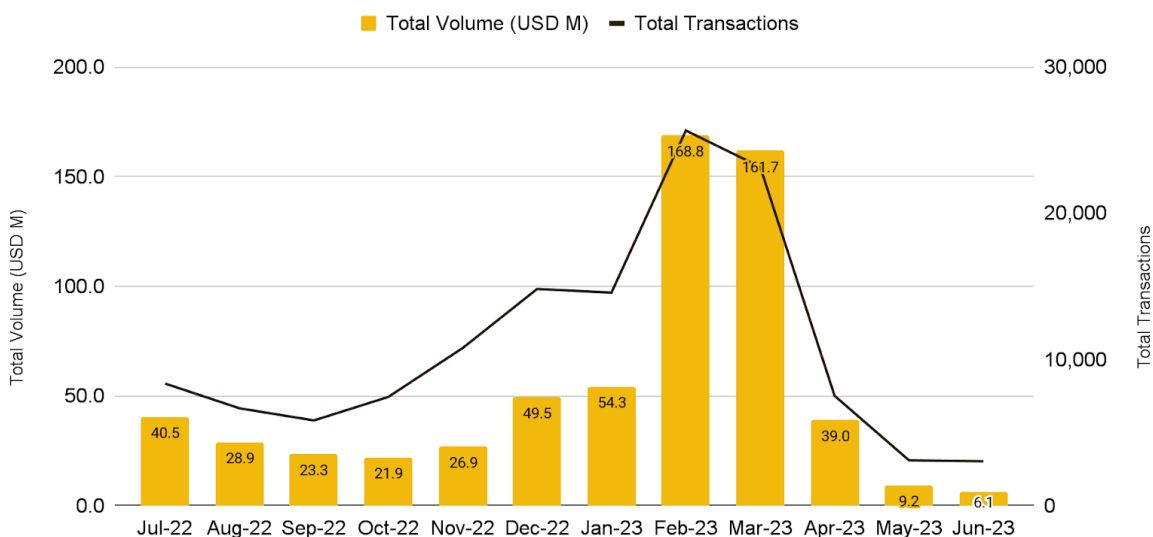
Source: Dune Analytics (@Kartod), Binance Research, as of June 30, 2023

While it remains to be seen if May and June 2023 volumes are the new norm or represent the bottom of the cycle, Metaverse-related metrics look better when zooming out and looking at them from a half-year perspective. The first half of 2023 recorded US$439.2M in Metaverse-related transaction volume, a stark increase on a HoH basis, although still significantly down from a year ago. Nonetheless, considering that we are in a very different part of the market cycle today, a year-on-year time frame may not exactly be the best basis for comparison.

Figure 83: Metaverse-related transaction volume exhibited signs of recovery as compared to H2 2022
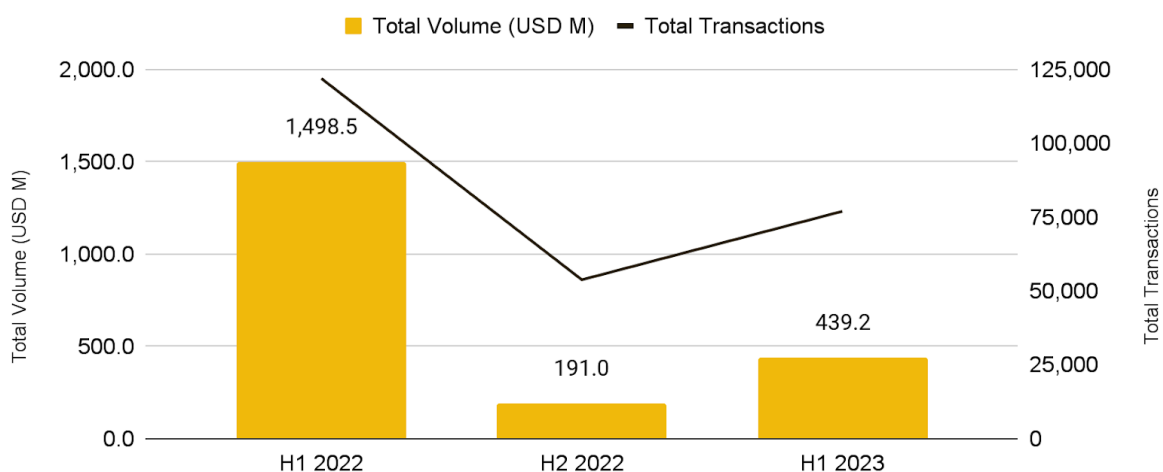
Source: Dune Analytics (@Kartod), Binance Research, as of June 30, 2023

Institutional Views on the Metaverse

Following what was arguably the peak in institutional interest when Facebook announced to rename the company to "Meta" in October 2021, the Metaverse has garnered relatively less mainstream media attention and institutional interest today. Nonetheless, based on a survey released by KPMG, it seems that there are still some positive indications that institutions are closely monitoring the space and that they acknowledge the potential benefits the Metaverse may bring.

Specifically, based on KPMG's global survey of 767 technology, media, and telecommunications executives, almost **6 out of 10 feel that the Metaverse will have a huge impact on consumers and businesses**. Additionally, a majority of respondents believe that companies can benefit from **increased revenue and higher profit margins** if they are able to successfully leverage the Metaverse.

Figure 84: Most believe a successful Metaverse venture would bring about financial benefits

From your perspective, what would success with the metaverse look like for your company?

Increased Revenue	61%
Higher profit margins/decreased operating expenses/shift from bricks and mortar to virtual point of sale	55%
Being seen as a leading brand at the forefront of metaverse technology	47%
Higher customer satisfaction/interaction with our company and products/services	45%
Employees using the metaverse to support customers	35%
Customers using our metaverse environments to engage with our company outside of making a purchase	34%
Employees using the metaverse to support internal processes	34%
Connecting our products/services into the broader metaverse environment	32%
Hosting our own metaverse environment that customers can use to buy our products/services	31%
Selling new digital products/services via the metaverse	29%

Source: KPMG

However, it is key to note that despite seeing potential in the Metaverse, most of the companies surveyed **(70%) are investing less than 5% of their 2023 technology budget in the Metaverse,** and 27% have zero funds committed. It seems that to get institutions to the next stage and invest more heavily in the sector, greater adoption is required. 60% cited that they are waiting for higher customer demand before making significant investments.

Figure 85: Higher customer demand was cited as the precondition for making the Metaverse successful

What do you believe are the macro-level preconditions that must be met for making the metaverse successful?

Increased customer demand	60%
Increased availability of development professionals with skill sets for building out metaverse experiences	53%
Increased trust in the industry for digital/online experiences	51%
Improved affordability of metaverse- enabling technology/hardware	48%
Mass availability/accessibility of metaverse enabling technology/hardware	38%
More concrete examples of the utility/usefulness of the metaverse	37%
Simplified user experiences for engaging in the metaverse	36%
Greater emphasis (and investment) from business leaders	35%

Source: KPMG

Such views are further augmented by our recent [Institutional Crypto Outlook Survey](#), which revealed that most institutional crypto investors interact with gaming and Metaverse apps to a lesser extent as compared to other crypto sectors. This highlights the relatively low adoption and usage of gaming and Metaverse dApps, even among crypto-native institutional investors.

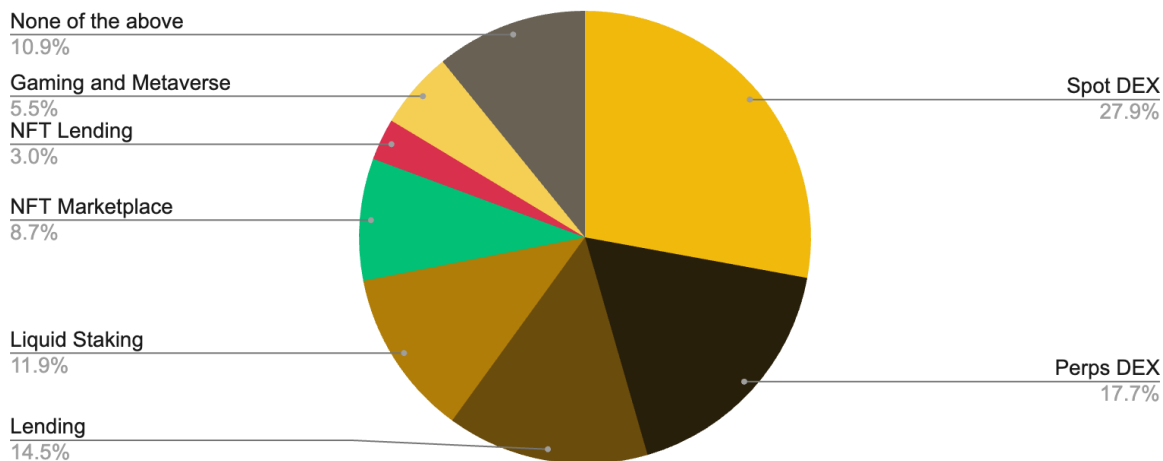**Figure 86: Gaming and Metaverse dApps had relatively less usage compared to other sectors**

Which of the following types of dApps have you interacted with in the past three months? (Select all that apply)

- None of the above 10.9%
- Gaming and Metaverse 5.5%
- NFT Lending 3.0%
- NFT Marketplace 8.7%
- Liquid Staking 11.9%
- Lending 14.5%
- Spot DEX 27.9%
- Perps DEX 17.7%

Source: Binance Research, as of June 30, 2023

Closing Thoughts

It has been a challenging time for the sector as adoption of gaming and Metaverse-related applications has slowed. Nonetheless, the long-term potential for blockchain gaming and the Metaverse is vast. As this sector continues to evolve, keeping a close eye on emerging trends and innovations will be crucial to navigating its promising yet ever-changing landscape.

9 Fundraising Activity & Institutional Adoption

9.1 Fundraising Activity

The first half of 2023 extended a decline in overall crypto deal activities with a fall in venture capital funding. However, crypto enthusiasts and renowned VC firms such as Andreesen Horowitz (a16z) expressed an optimistic outlook. They cited the ongoing research and development in the space, believing that this 'price-innovation' cycle will continue, creating opportunities for Web3 technologies[133].

Furthermore, we note the emergence of opportunistic funds, which have raised significant capital. While the majority continue to focus on DeFi, infrastructure, and other Web3 sectors, some have emerged to acquire distressed and undervalued assets. Of all the fundraising activities, Hub71+ Digital Assets stands out, having raised US$2B in a collective effort across organizations. **The top 10 funds raised a total of US$3.61B for the first half of 2023**.

Figure 87: Top 10 raises by Web3-focused funds

Fund	Amount raised	Date	About
Hub71+ Digital Assets	US$2B	02/15	Abu Dhabi has launched Hub71+ Digital Assets with over US$2B of capital to fund Web3 startups and blockchain technologies in the region. This will consist of the US$1B Venom Ventures Fund, Binance's US$500M and TONcoin.Fund's US$250M.
HashKey FinTech Investment Fund III	US$500M	01/17	Global asset management firm Hashkey Capital announced "Fund III" to invest in crypto and blockchain initiatives, with a focus on emerging markets. This includes infrastructures, toolings, and applications with the potential for mass adoption.
Theory Ventures	US$230M	04/07	VC investment firm Theory Ventures debuted its US$230M fund, which aims to make seed and Series A investments in startups that focus on data, Web3, and machine learning.
Core DAO Ecosystem Fund	US$200M	04/18	Core DAO has partnered with Bitget and MEXC to launch their US$200M ecosystem fund to

Fund	Amount raised	Date	About
			accelerate the development of dApps and protocols on the Core L1 blockchain.
Injective Ecosystem Fund	US$150M	01/25	L1 blockchain, Injective has launched its US$150M ecosystem fund to support projects building on Injective or Cosmos blockchains in the interoperability, DeFi, trading, PoS infrastructure, and scalability solutions sectors.
Deal Box Ventures	US$125M	01/18	VC firm Deal Box unveiled its new US$125M fund and VC arm to support blockchain and Web3 businesses.
DeFiance Capital	US$100M	03/13	Web3 VC firm DeFiance Capital reportedly raised US$100M for its liquid token fund, aiming to invest in tokens trading below its venture round valuations.
Bitcoin Opportunity Fund	US$100M	03/17	The Bitcoin Opportunity Fund raised US$100M to enable high net-worth investors to invest in the Bitcoin ecosystem. This includes public and private Bitcoin-adjacent companies.
Bitget Web3 Fund	US$100M	04/10	Trading platform Bitget launched its Bitget Web3 Fund to focus on Web3 VCs and projects.
CCMC Global	US$100M	05/07	Hong Kong based CCMC Global has unveiled its US$100M blockchain fund to focus on startups in Asia, especially Hong Kong firms in the Series A and B stages.

Source: Binance Research, Binance Labs

Apart from these crypto-dedicated funds, we also saw significant investments made in projects raising capital to scale and expand their operations. It appears that VCs are shifting toward an infrastructure focus such as mining facilities, cross-chain bridges, lending, and hardware-related projects. However, compared to 2022, we note that the average deal size has considerably fallen due to market conditions.

Blockstream, the bitcoin infrastructure company, and LayerZero raised the highest amounts of capital at US$125M and US$120M respectively. The top 10 biggest raises by Web3-focused projects account for close to US$870M.

Figure 88: Top 10 raises by Web3-focused projects

Fund	Amount raised	Date	About
Blockstream	US$125M	01/24	Blockstream, a crypto infrastructure company,

Fund	Amount raised	Date	About
			raised US$125M to expand its bitcoin mining facilities to meet the rising demand for large-scale hosting services.
LayerZero	US$120M	04/04	The Series B funding round of US$120M for LayerZero Labs is intended for growth initiatives such as hiring and expanding the company's presence in the APAC region.
Worldcoin	US$115M	05/25	Crypto ID project Worldcoin has raised US$115M in a Series C round. The capital aims to help accelerate research, development, and growth efforts on the project and showcase World App, the crypto wallet for the ecosystem.
Ledger	US$109M	03/30	Hardware wallet provider Ledger has raised US$109M in a Series C round to expand the company's distribution network, increase production, and develop new products.
Auradine	US$81M	05/16	Web infrastructure solutions provider, Auradine has raised US$81M in its Series A round to help scale its operations.
Chain Reaction	US$70M	02/23	Blockchain chip startup, Chain Reaction raised US$70M to expand its engineering capabilities as it develops its next chip to improve blockchain operations.
Taurus	US$65M	02/14	Infrastructure provider Taurus raised US$65M in Series B funding to make new hires and expand across Europe and the UAE.
SALT Lending	US$64.4M	02/08	SALT Lending has raised US$64.4M in a Series A funding round to develop its products and growth strategy.
Unchained Capital	US$60M	04/18	Bitcoin lender and custodian Unchained Capital has received US$60M in Series B funding to expand its reach and services.
Quicknode	US$60M	01/24	Development platform Quicknode has closed a US$60M Series B funding round to expand its suite of services and growth platform with new products.

Source: Binance Research, Binance Labs

Taking a step back, we previously observed that DeFi applications were the most active investment between late 2020 and mid-2021, followed by NFTs and gaming companies coming into 2022. Ending June 2023, we saw under 500 investments within the crypto space. A clear area of interest has surfaced, with the **infrastructure sector attracting the**

most investments, followed by gaming/entertainment and DeFi. Asset management saw the lowest amount of investments for the first half of this year.

Figure 89: Number of venture capital crypto investments showing infrastructure is most favored for the first half of 2023
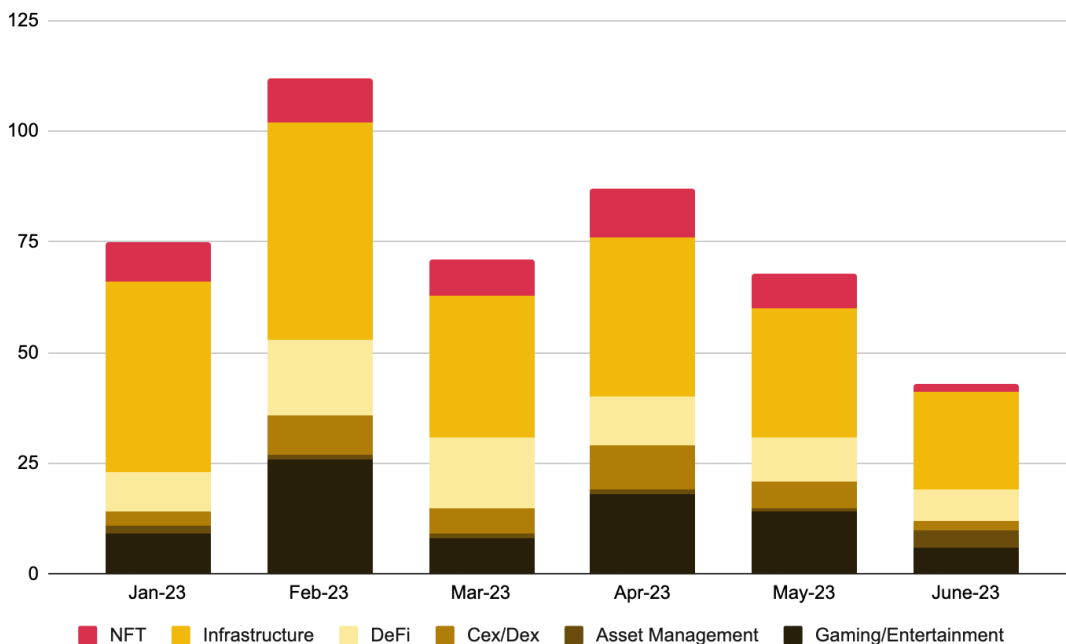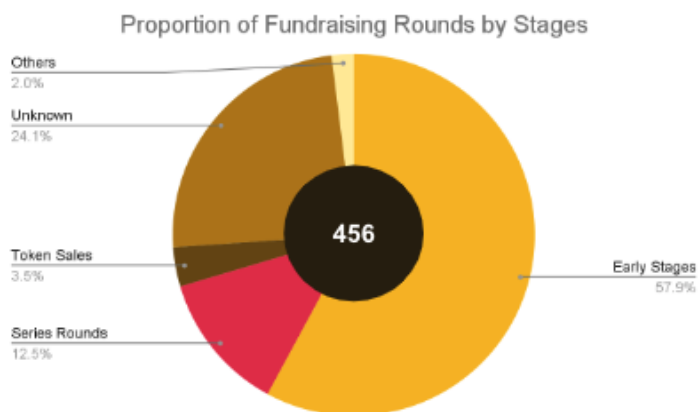

Source: Binance Research, Binance Labs

In the meantime, the majority of fundraising happened during the early stages, possibly suggesting that VCs still continue to take note of these new opportunities.

Figure 90: Majority of fundraising activities occurred during the early stages

Fundraising Rounds	Number
Early Stages i.e. Pre-Seed, Seed, Strategic	264
Series i.e. A, B, C	57
Token Sales i.e. Public, Private	16
Unknown	110
Others eg. Debt Financing, Equity Financing, IPO, Community Raise	9
Total	456

Proportion of Fundraising Rounds by Stages

Others 2.0%
Unknown 24.1%
Token Sales 3.5%
Series Rounds 12.5%
Early Stages 57.9%
456

Source: Binance Research, Binance Labs

Although valuations and investments have taken a hit, it is comforting to still see healthy capital flowing in to build the necessary infrastructure as existing projects seek to expand in these challenging times. Undeniably, we posit that the market will develop and mature, and we will continue to observe where capital is flowing.

(9.2) Institutional Adoption

Blockchain innovations have caught the attention of traditional institutions as they embrace the new technology. Many are exploring the potential benefits of using digital currencies and potentially using them to disrupt existing industries. Despite a challenging environment, we note that many countries and firms have been steadily entering the space.

Building Infrastructures

Since January 2023, we have witnessed companies and projects actively engaged in the research and experimentation of blockchain technologies to explore their use cases.

CBDC Pilots

Central banks have continued to launch and expand their pilot programs for CBDCs to bridge different payment services and build a new integrated financial system. Based on the CBDC tracker, over 65 countries have been conducting studies to understand its use cases, and some governments have rolled them out to the public.

- China has made a significant push to roll out its digital yuan (e-CNY) to the mainstream public. This includes initiatives such as enabling residents to pay for their subway ride using the e-CNY wallet and paying public sector workers in the digital currency in certain cities.

- Hong Kong announced its e-HKD pilot program in May as part of the city's exploration to implement a retail CBDC. 16 firms are involved in these pilots to understand the potential use cases.

- The Colombian central bank has partnered with Ripple to leverage the latter's CBDC platform to pilot use cases and improve its high-value payment system.

- The Bank of Japan has also joined the ranks of other countries in unveiling its CBDC pilot project in April to test the use of a digital yen. It aims to conduct simulated transactions with private financial institutions in a test environment. This comes as the country became one of the first major economies to pass the stablecoin bill, providing a legal framework around the digital asset. Furthermore, Japan's biggest

bank, MUFG, is in talks with companies to issue global stablecoins on its blockchain platform while using Progmat to issue security tokens.

- The Bank of International Settlements and the Bank of England have jointly announced "Project Meridian" to build a prototype that uses distributed ledger technology (DLT) to link the central bank's real-time gross settlement (RTGS) system with other financial market infrastructures to speed up and reduce the costs of interbank transactions. This followed the "Project Rosalind" initiative, announced in June, that aimed to leverage APIs in CBDC systems to facilitate retail payments.

- In June, Thailand launched its retail CBDC pilot with three payment providers and aims to involve up to 10,000 users in its regulatory sandbox through August.

- In early July, the NY Fed concluded its months-long digital-dollar test with banks including Citigroup and Wells Fargo. It was conducted on a regulated liability network where banks explored the potential for 'tokenized regulated deposits' and improved wholesale payments on a shared ledger. The proof-of-concept experiment was met with much positivity, and further 'engagement with regulators' is ongoing to determine a final conclusion.

Experimenting With Blockchain Technologies

We also saw notable organizations and firms partnering with blockchain firms, delving deeper into these blockchain technologies:

- In June, Swift announced its collaboration with Chainlink, along with a few financial institutions such as BNY Mellon, Citi, and BNP Paribas, to explore the transfer of tokenized assets across blockchains using Swift's infrastructure. This aims to enhance efficiencies in settlement processes for capital markets.

- Visa recently announced its ongoing experimentation with account abstraction and ERC4337. It unveiled its Paymaster contract and suggested that it could facilitate the use of ERC-20 tokens to cover gas fees. This paves the way for users to possibly pay transaction fees using alternative tokens such as stablecoins or CBDCs.

- Traditional finance and technology firms such as Goldman Sachs, Microsoft, BNP Paribas, Cboe, and Deloitte have come together to join the new blockchain system, the Canton Network. The companies seek to unravel the potential for institutional blockchain interoperability.

Expanding Access to Trading Cryptocurrencies

Traditional institutions such as asset management firms, brokerages, and exchanges have started to offer clients and customers the opportunity to trade cryptocurrency assets. They

seek to fill the void and uncertainty following the high-profile collapse of intermediaries such as FTX in the digital asset space.

- In February, DZ Bank in Germany announced plans to offer BTC trading to its customers. This was then followed by DWPBank in Germany, which launched a new platform (wpNex) in March that will enable 1,200 German banks to offer BTC trading to their customers.

- The digital asset arm of the Chicago Board Options Exchange ("Cboe Digital") has been granted approval from the CFTC to enable investors access to regulated crypto trading via margin futures contracts. This will expand the suite of derivatives for clients to trade BTC and ETH futures on the platform, which will be launched in the second half of 2023.

- Previously only available to institutions, Fidelity Investments has released its Fidelity Crypto platform to enable retail traders to access BTC and ETH trading. The custodial and trading services will be provided by Fidelity Digital Assets.

- The Securities and Futures Commission of Hong Kong implemented a new licensing framework for crypto platforms, announcing that retail investors will be able to trade these digital assets from June 1.

- On June 15, Blackrock filed for a spot Bitcoin ETF (iShares Bitcoin Trust) that would enable investors to get exposure to the cryptocurrency. The firm will use Coinbase Custody as its custodian.

- EDX markets, the new crypto exchange backed by prominent financial institutions such as Citadel Securities, Fidelity Investments, and Charles Schwab, was launched on June 20. It aims to introduce EDX Clearing, a clearinghouse that aims to settle trades executed on the platform.

Real World Assets

Real-world assets stood out as an emerging sector, with many companies bridging these assets into DeFi. The tokenization of RWAs, which represent tangible assets such as real estate and intangible assets such as government bonds or carbon credits, is placed on the blockchain, enhancing efficiency and convenience for transitions.

Traditional Institutions

- German-based Siemens issued a $63M digital bond on Polygon in February to finance capital investments.

- Swiss bank UBS successfully executed its first intraday cross-border repo trade with a global Asian Bank using Broadridge's Distributed Ledger Repo.

DeFi bridges into CeFi

Similarly, the DeFi ecosystem has enjoyed a surge in interest in diversifying its reserves and revenue by investing in traditional financial assets.

- Leading crypto lending protocol MakerDAO has embarked on several approved proposals that will open RWA vaults to generate yield for their assets, USDC and DAI. In April, the protocol opened a vault for Coinbase Custody and approved the transfer of up to US$500M in USDC stablecoins for a 2.6% yield. Subsequently, on June 2, the community once again voted to open a new vault with BlockTower to invest a maximum of US$1.28B in short-dated US Treasury bonds.

This highlights the rising demand for protocols to utilize traditional financial instruments for treasury management.

We believe that **RWAs remain a critical driver for widespread adoption of digital currencies**. There have been signs of institutions growing more comfortable with the technology, helping fuel the continued growth in this space. Likewise, DeFi and crypto-native entities have begun to embrace traditional financial assets, **bridging the chasm between the on-chain and off-chain worlds.** As more countries and institutions embrace and explore the use of blockchain technologies, the next few months will be an interesting journey as the space expands and matures.

10 Conclusion

The first half of 2023 recorded a turbulent period involving the juxtaposition of increased institutional interest and adoption alongside increased regulatory scrutiny. Against the backdrop of a fragile macroeconomic environment, markets have experienced continued volatility as investors reel in their exposures to err on the side of caution. Indeed, many projects are starting to feel the heat as activity slows and funding dries up. On the other hand, blue-chip performance, especially that of Bitcoin, has been incredibly strong, outpacing all major TradFi investments. Bitcoin dominance has reached multi-year highs, and the correlation with TradFi has reached multi-year lows, all while the largest crypto asset sees increased excitement and energy owing to new ecosystem developments. Despite the relatively volatile performance of smaller and alternative crypto assets, we posit that this challenging period will provide a good time for teams to build upon and improve their existing models and products to prepare for the next resurgence.

Indeed, despite these uncertainties, we have also witnessed unprecedented interest from institutions that have proactively taken steps to explore and participate in the industry. Additionally, the market has largely benefited from the "Bitcoin ETF" season, driving the market's newfound momentum as Bitcoin soared to new highs for the year, helping boost investor confidence.

As we embark on the second half of the year, we look forward to seeing further innovations, greater adoption, and an even brighter future.

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A study of institutional clients' attitudes, preferences, adoption, and motivations toward cryptocurrency investments.
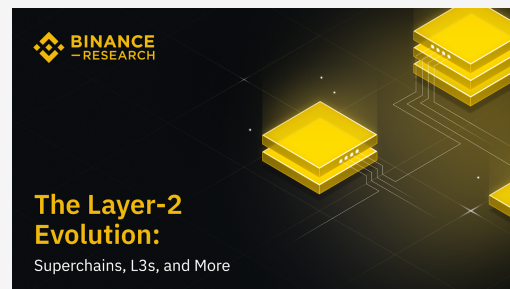
The Layer-2 Evolution: Superchains, L3s, and More

A deep dive into the Layer-2 evolution, discussing the Superchain, L3s, and more.
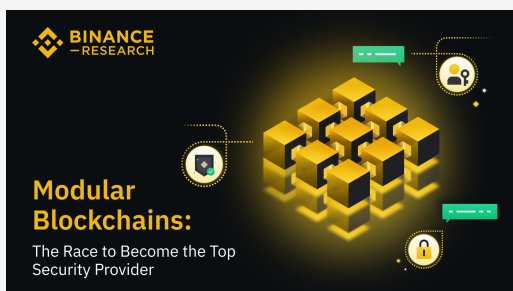
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About Binance Research

Binance Research is the research arm of Binance, the world's leading cryptocurrency exchange. The team is committed to delivering objective, independent, and comprehensive analysis and aims to be the thought leader in the crypto space. Our analysts publish insightful thought pieces regularly on research topics, including but not limited to the crypto ecosystem, blockchain technologies, and the latest market themes.

Jie Xuan Chua, CFA
Macro Researcher

Jie Xuan ("JX") is currently working for Binance as a Macro Researcher. Prior to joining Binance, he worked as a Global Investment Specialist with J.P. Morgan and had prior Equity Research experience at various fund houses. JX is a CFA charterholder. He has been involved in the cryptocurrency space since 2017.

Moulik Nagesh
Macro Researcher

Moulik is a Macro Researcher at Binance, having been involved in the cryptocurrency space since 2017. Prior to joining Binance, he had experience spanning cross-functional roles in Web3 and Silicon Valley-based tech companies. With a background in co-founding start-ups and a BSc in Economics from the London School of Economics & Political Science ("LSE"), Moulik brings a comprehensive perspective to the industry.

Shivam Sharma

Macro Researcher

Shivam is currently working for Binance as Macro Researcher. Prior to joining Binance, he worked as an Investment Banking Associate / Analyst at Bank of America on the Debt Capital Markets desk, specializing in European Financial Institutions. Shivam holds a BSc in Economics from the London School of Economics & Political Science ("LSE") and has been involved in the cryptocurrency space since 2017.

Colin Chan

Macro Research Intern

Colin is currently an intern with Binance on the Macro Research team. Prior to joining Binance, he interned as a Trader with Genesis Global Trading. Additionally, Colin has had experience as a data analyst, spending time with Paypal's Enterprise Architecture Team. Colin is an undergraduate at the National University of Singapore, where he is studying Business and Computing (Information Systems).

Resources

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