

# On-Chain Stablecoin Liquidity Report

A series of case studies on successful liquidity strategies used by pegged tokens, offering a framework for efficient liquidity incentivization.



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### On Chain Stablecoin Liquidity Report

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#### Abstract

This report studies successful stablecoin liquidity to estimate USDe liquidity's optimal size and distribution to absorb secondary market activity effectively.

The Ethena protocol issues USDe, intended to be pegged to \$1. On-chain liquidity plays a critical role in matching supply and demand flows arriving at different times so that the price impact of each flow is minimized. This improves the peg performance and user experience by also keeping slippage low.

For context, the evolution of where a range of stablecoins have been used is assessed. There is a focus on the DEX share as a percent of total supply to view the real-world evolution of liquidity.

The distribution of certain stablecoin and pegged tokens liquidity across different pool types is analyzed to gather insights from their past learnings and market dynamics. This forms the basis of the recommended liquidity strategy.

The average recent DEX TVL of prominent stablecoin DEX pools is analyzed to determine how much liquidity other stablecoins that have maintained their peg attract in practice. The distribution of liquidity across the entire spectrum of prices is studied to add nuance to this strategy.

The distribution of trade sizes in these stablecoin pools estimates the sizes of individual trades USDe will attract to ensure sufficient liquidity from a slippage and user experience point of view.

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### Chapter 1

### Introduction

This report aims to study on-chain liquidity strategies and trends of successful stablecoins and other pegged tokens such as LSTs. This includes the amount of liquidity and, notably, the distribution of this liquidity across the entire price range.

Liquidity to swap pegged tokens for as close to their par value as possible is crucial to their success and part of their value proposition. This liquidity needs to absorb all temporary imbalances between supply and demand for the token in a way that minimally affects price. In addition, this liquidity needs to be sufficiently deep to absorb flows of all sizes efficiently. In rare occasions that adverse price action moves prices away from its peg, there still needs to be enough liquidity for efficient price discovery and reasonable trading conditions.

The report is structured as a series of case studies focusing on individual aspects of relevant successful stablecoins and pegged tokens. These case studies inform estimates of USDe behavior used to estimate liquidity requirements.

The demand for liquidity is a function of the token velocity and the natural ebbs and flows of demand to buy and sell the token through time. To estimate the user behavior in this respect, the mint and redeem distributions of relevant existing stablecoins are studied along with their velocity through time.

The shape of liquidity is crucial to ensure the most efficient liquidity usage given cost constraints. Once USDe is sufficiently mature and price action has settled around its peg, the total market shape of the cumulative bonding curve across all venues should be as thick as possible in a narrow range around \$1 as this is ideally where most trading activity will happen.

Beyond this tight, highly liquid range, there must still be enough liquidity for price formation and a functioning market. However, because this liquidity will not be utilized very often, it acts as more of an insurance against something going temporarily wrong and, therefore, should be priced as such. This means the synthetic dollar can tolerate lower liquidity in this range as something is likely happening to cause the price to move away from its peg, and therefore, price volatility is expected. It also means this liquidity should require incentives above regular trading fees as the infrequent use underprices its value in times of need.

Lastly, it should be noted that no amount of liquidity can overcome persistent mismatches in demand to buy and sell a stablecoin. This is the job of the protocol's primary market to expand or contract supply, in Ethena's case, its peg arbitrage mechanism using stETH. **The role of liquidity is solely to maintain the most efficient secondary market**  functioning of USDe.

### Chapter 2

# Mint and Redeem Behaviour of Different Stablecoins

When evaluating DEX liquidity, the accessibility and speed of the mint/redeem mechanism are paramount to understanding the differences in liquidity needs. This section explains the process used by a range of different stablecoins used for later analysis.

From there, the distribution of daily primary market activities is analyzed to estimate the range of daily supply/demand mismatches faced by successful stablecoins.

#### **1** Fiat Backed Stablecoins

Fiat-backed stablecoins, such as USDC and USDT, can be minted against a dollar received or redeemed for a dollar. This means that if prices drift sufficiently off their peg to cover transaction costs, arbitrageurs have a simple trade to profit until the peg is restored. These tokens usually trade extremely close to their peg for this reason, although both USDC and USDT have experienced periods of trading off peg due to issues with redemptions.

There can be reduced accessibility or frictions in this process, such as whitelisted access, used by USDC and USDT, or fees to redeem as used by USDT.

#### 2 DAI

DAI can be minted and redeemed against a range of collaterals. In this context the focus is on the Maker Price Stability Mechanism (PSM) as the main peg keeper for DAI. The PSM acts like feeless, no-slippage DEX where anyone can exchange USDC and DAI at par.

This relies on the stability of USDC to maintain its peg and has been successful with the exception of the March 2023 USDC depeg weekend.

#### 3 FRAX

FRAX is minted and redeemed for a combination of other stablecoins and its native token FXS. For peg maintenance, FRAX introduced Algorithmic Market Operations (AMOs). This process is where FRAX is minted to or burned from specific AMM pools to keep the pools balanced and the price close to par.

Governance-controlled parameters dictate the specific pools and parameters of these AMO operations. The process is effectively frictionless and automated. It is unique that the peg maintenance is entirely performed by the protocol itself, not relying on arbitrage.

This also relies on the stability of other stablecoins to maintain its peg, and FRAX also depeged over the USDC depeg in March 2023.

#### 4 LUSD

Liquity is a borrowing protocol issuing LUSD against ETH collateral for a 0.5% once off fee, without any recurring interest rate.

Liquity has multiple peg support mechanisms.

Firstly, LUSD can be redeemed for ETH at face value (1LUSD for \$1 of ETH) by debtors. This provides some peg support from below as, in theory, rational debtors should buy cheap LUSD and redeem for more valuable ETH when the LUSD price is below \$1. This alone is insufficient to maintain its peg from below as the mechanism is only available to debtors who could have other reasons not to perform this action.

To bolster the mechanism, when LUSD is below \$1, the least healthy debt troves can be liquidated by an arbitrageur. The arbitrageur needs to supply LUSD, which is burned in return for the equivalent dollar amount of ETH. This is accessible to anyone and only incurs gas costs, providing more peg support from below.

When LUSD trades above \$1.10, arbitrageurs can mint LUSD, which is then sold at a profit.

#### 5 Daily Primary Market Activity

The mint and redeem behavior of existing stablecoins, and particularly the behavior in the extremes, is used to estimate the likely primary market activity for USDe. Stablecoins have different collateral backing and peg maintenance frameworks; therefore, an equivalent with similar characteristics should be used. To help estimate USDe behavior, the mint and redeem activity of USDC and DAI are used as case studies.

USDC is chosen as the stablecoin with the most similar characteristics from a mint and redeem point of view. It is not backed by debt and therefore, is less affected by credit cycles and price moves and its primary market is on Ethereum, although this is evolving. Most other stablecoins have complex peg maintenance operations that are incentivized by more than demand for their respective stablecoins.

DAI has evolved from a primarily debt-backed stablecoin to a variety of collaterals backing it. Activity with the Maker Price Stability Mechanism (PSM) is used instead of minting and burning to better model activity related to imbalances between demand and supply requiring interaction with the issuing protocol.

Of most relevance for USDe would be the tails of the distribution of gross activity levels to see how much volume is needed to process relative to total issuance on the most active days and the left tail of net activity, representing the likely most significant net redemptions.

The volatility of net daily issuance through time is used to get an idea of how both the maturity of the token and the market environment can affect primary market activity.



Figure 2.1



Figure 2.2

The standard deviation in the daily net issuance of USDC has reduced over time. This can also be attributed to the DeFi ecosystem maturing generally, more muted market conditions, and a gradual reduction in supply from late 2021.

Ethena could also expect greater primary market activity early on.



Figure 2.3

Activity with the DAI PSM shows a similar distribution to USDC mint and redeem behavior with a slightly smaller range of net activity relative to supply.

Looking into the drivers of DAI PSM activity since January 2022 it is clear that there is a positive linear relationship between DAI volatility and PSM volumes. This dataset implies that each marginal basis point of DAI volatility adds approximately 16bp of PSM activity. This is independent of the direction of flows.



Figure 2.4: Note: Outlier activity over the USDC depeg on 11-12 March 2023 is excluded.

USDe can be expected to experience similar steady-state demands on its primary market activity as USDC and DAI. The 95% range of daily net USDC mints as a percent of supply is [-2%, 3.4%], and for DAI, it is [-1.65%, 1.75%].

### Chapter 3

# Evolution of Stablecoin DEX Liquidity

This case study uses stablecoin usage in DeFi, focusing on DEXs in particular, to inform the possible liquidity needs of USDe. A wide range of stablecoins are studied to draw sound conclusions across a range of factors. LUSD is chosen as the closest comparable to USDe initially due to its small market cap, DeFi integrations, and soft peg. The others are included to study how this could evolve and for context.

The on-chain liquidity demands of a stablecoin depend on its use across DeFi. For example, a higher proportion of USDT is used on centralized exchanges than USDC. Therefore, on-chain liquidity requirements as a percentage of market cap are lower, all else equal. Other essential factors worth considering are the amount used in lending protocols, which need to provide sufficient liquidity to absorb liquidations, the existence of stability pools or PSMs, which act as an in-protocol DEX, and the expected velocity of all categories of holders.

This chapter provides the historical breakdown of the TVL share of each stablecoin for context. Stablecoin use is an input into the following analysis and can be used to normalize liquidity requirements between stablecoins for comparison.

Transaction velocity, defined as daily transaction value divided by total supply, provides one measure of the daily potential liquidity needs of a stablecoin. Excluding DAI, which is highly variable in its daily usage, USDC typically has the highest daily transaction velocity of 20% - 40%. This is intuitive, given its use in DeFi. Most other stablecoins see between 5% and 10% of their supply trading per day. This has dropped from between 10% and 20% in more vibrant market conditions two years ago.

The overall trend in the larger stablecoins of lower DEX TVL as a percentage of the total results from more highly concentrated liquidity on DEXs such as Uniswap v3 and Maverick.

#### 1 USDC

USDC is used everywhere in DeFi and carries the risk of spikes in demand for DEX liquidity. The share on centralized exchanges has also been gradually falling, while holdings in treasuries and EOAs have increased. Despite the seemingly growing need for liquidity, the percentage on DEX's has fallen over time until the start of 2023, when it has remained constant at around 3% of supply.

The market appears to have found an equilibrium between the return required by liquidity



Figure 3.1: 30-day Moving Average Transaction Velocity of Various Stablecoins.

providers, the amount of USDC DEX activity, and the amount of liquidity needed given DEX designs. An interpretation could be the on-chain liquidity needs of a mature, highly integrated stablecoin is 3%-5\%, potentially increasing to 5%-10% in more active market conditions.



Figure 3.2



Figure 3.3

#### 2 USDT

Approximately a third of Ethereum USDT is in centralized exchange wallets. As a share on TVL, the amount used in DeFi other than bridges is relatively small. The primary liquidity risk from USDT arises from its use in lending protocols should large, correlated liquidations happen.

Like USDC, the share of USDT on DEXs has fallen, but it appears to be continuing this fall to its current 1% of supply. This is down from 3%-6%. This could imply the on-change liquidity needs of a mature, primarily transnational stablecoin.



Figure 3.4



Figure 3.5

#### 3 DAI

DAI usage has evolved more dramatically than the previous fiat-backed stablecoins. The presence of the large Maker PSM can facilitate approximately 8% of DAI supply redemptions for USDC. The size of the PSM has dropped significantly this year from \$2bn at the start, briefly touching \$4bn during the USDC depeg in March.

DAI on DEX's has continued to trend lower, too, down to 5% currently despite the much smaller PSM. MakerDAO also allows DAI LP positions as collateral to mint DAI and thus effectively owns some of this liquidity.



Figure 3.6



Figure 3.7

#### 4 FRAX

FRAX is an outlier in the high percentage of liquidity held on decentralized exchanges, which is by design. The stablecoin is built on AMMs for its peg stability through AMOs, and with USDC, it makes up the second stablecoin base pool FRAXBP for other stablecoins to use for bootstrapping liquidity. For these reasons, the share of DEX TVL of FRAX is not very informative in measuring its needs as a slightly less mature stablecoin.

This is included for informational purposes and to give context to later sections.



Figure 3.8



Figure 3.9

#### 5 LUSD

The design of Liquity, with its stability pool holding a large share of total LUSD, means around half of total LUSD is currently static and, therefore, does not require liquidity. For this reason, it makes sense to double the actual DEX share compared to other stablecoins. The actual DEX share has been volatile and is currently just below 10%, up from 3% at the beginning of the year.

LUSD is an example of the liquidity needs of a less mature and softer peg successful stablecoin. Twice, its 10% (because of the stability pool LUSD) could be a reasonable benchmark for the amount of liquidity for a sub-\$250m stablecoin and provide a comparable for USDe. It also shares a similar peg stability mechanism from below.



Figure 3.10



Figure 3.11

#### 6 Summary

The following conclusions can be drawn from the stablecoin TVL breakdowns above. The primary assumption is that TVL results from market forces matching demand and supply through pool APR. The possible exceptions of DAI and FRAX are noted with the reasons.

- More mature stablecoins have relatively less supply on DEXs than newer ones. This is likely the result of non-linear liquidity requirements with respect to total supply. As stablecoins mature, they typically attract more concentrated liquidity.
- The more connected to other categories of DeFi a stablecoin is the greater its liquidity requirement.
- Liquidity requirements measured by DEX TVL have come down recently, presumably due to market conditions and greater liquidity concentration. These could rise should activity pick up generally.
- LUSD provides an interesting case study of a softer peg, sub \$250m stablecoin's current liquidity needs. This can be normalized to approximately 20% of its liquid supply, \$24m on DEX's.

### Chapter 4

# Stablecoin Liquidity Case Studies

These case studies are compiled to understand the evolution of liquidity strategies of three tokens requiring stability against an index. Stablecoins and successful pegged tokens use a polarized strategy to minimize volatility around their peg while maintaining sufficient liquidity further away to facilitate trading and price discovery should it be needed.

The intention is to dive deeply into three slightly different implementations and the tradeoffs involved. The tradeoffs mostly revolve around the configuration of the Curve pool being incentivized, as market forces then govern the concentrated Uniswap v3 and Maverick pools to attract specific liquidity at different depths.

The metrics analyzed are the relative share of trading volume and TVL across major stablecoin DEXs, the distribution of DEX trade levels, and the distribution of liquidity by price. The distribution of liquidity by price is measured relative to a constant product AMM pool, where the shape of a constant product pool would be flat at the level of pool TVL. This allows comparison between different bonding curves.

The distribution of trade levels infers which liquidity is being utilized.

#### 1 Frax

FRAX is built on top of the Curve Protocol. The Curve FRAX-USDC pool is used for its AMOs to maintain its peg and the primary use case targeted is incentivized liquidity on Curve to be used by other stablecoins as a base asset. This Curve pool has a high, 1,500 amplification parameter concentrating liquidity tightly around its peg. This pool is heavily incentivized.

Almost 40% of FRAX DEX liquidity is on Uniswap v3. Interestingly, unlike the other case studies below, the distribution of this Uniswap liquidity is less concentrated than the Curve liquidity. The result is that Uniswap underperforming in terms of trading volume relative to TVL. The highly concentrated Curve liquidity appears to push the market equilibrium on Uniswap to a less concentrated state.

FRAX also has a much more uniform shape relative to the price levels traded at. This is the likely reason for less concentrated Uniswap liquidity by LPs who target trades around the extremes while foregoing trades very close to the peg.

Lastly, it is interesting that there is only meaningful liquidity on Uniswap and Curve, the high Curve pool amplification and incentivized TVL could crowd out potential other concentrated pools. It is easier to bootstrap a lower TVL, but highly concentrated pool

#### than a broader one.



Curve Sees a Higher FRAX Volume Share than TVL Share





Fairly Uniform Distribution in FRAX-USDC Trade Activity

Figure 4.2



FRAX Curve Liquidity Acts as the Concentrated Pool With Uniswap v3 Serving a Wider Range

Figure 4.3: Virtual Liquidity as defined by constant product liquidity.

#### 2 LUSD

Liquity's LUSD is the clearest case study of a stablecoin that is relatively volatile around its peg. Over the past 90 days, its hourly volatility has been 0.26%, vs 0.07% for USDT. By design, it has a soft peg. What is unique about LUSD DEX pools is the less concentrated liquidity due to the wider price range and, with that, higher fees demanded by LP's. One tradeoff of less stablecoin stability is higher transaction costs and slippage.

Like FRAX, most DEX liquidity is in the curve incentivized Curve pool, with an amplification parameter of 500 and a higher 4bp fee. This amplification is high relative to LUSD volatility and concentrates liquidity around \$1.

Both the Uniswap and Maverick pools have their liquidity concentrated approximately 50bps wide. The trading range of LUSD indicates that trades frequently happen beyond this point, and the fat tails of the trading range could be a function of liquidity thinning out beyond this.

The main Uniswap pool with USDC has a 5bp fee and is also less concentrated than other stablecoin Uniswap v3 pools with thick liquidity approximately 60bps wide.

The Maverick pool has a 3bp fee and is more concentrated than the others, with most liquidity 40bps wide. This slightly more concentrated and low fee means it gets a much higher volume share than TVL.

Curve Sees Lower LUSD Volume Share than TVL Share



Figure 4.4

Wider trading Range for LUSD - 97.3% of trades are in the range [-62bps, 133bps] Relative to Peg



Figure 4.5

#### 3 stETH

stETH needs to remain stable against the price of ETH. It is paired against ETH in almost all relevant DEX pools and has recently achieved impressive stability.

Three main stETH liquidity venues are capturing almost all trading volume currently. Uniswap, Maverick, and Balancer have recorded around 93% of trading volumes over the past three months. Curve sees around 5.5%.

The Curve stETH pool is crucial to ensuring deep liquidity to facilitate price discovery



LUSD Liquidity is Medium Concentrated on Both Uniswap and Curve





Curve Sees a Much Lower stETH Volume Share than TVL Share

Figure 4.7

away from par to ETH and maintain secondary market liquidity there. Without this it would be impossible to sell stETH for ETH in DeFi away from a few bps from par, there would be no price discovery and the incentive to repeg would vanish. To incentivize this liquidity, underpriced by the market in most conditions Lido has typically offered LDO incentives, recently changed to stETH incentives to improve pool yield.

This polarized liquidity has been highly effective at keeping stETH close to its peg since withdrawals were enabled despite a duration mismatch between minting and redeeming stETH. ETH-stETH volatility is also similar to stablecoins due to the highly concentrated

#### 94% of stETH Trades Happen Within 10bps of Par



Figure 4.8

Most Trading Volume Utilizes Concentrated Uniswap Liquidity



Figure 4.9: Virtual Liquidity as defined by constant product liquidity.

liquidity around fair value.

The Maverick pool has almost all liquidity in a 10bp range, and the Uniswap pool has a 20bp range. The Balancer pool has an amplification parameter of 2000, 15x that of the Curve pool's 30.

There is approximately 100 000 stETH worth of liquidity (not including ETH liquidity) in these stETH pools, approximately 1.25% of stETH supply.

#### 4 Takeaways

Uniswap and Maverick liquidity responds to the configuration of the Curve pool. These pools are unincentivized and therefore more driven by market forces. Often the total amount of liquidity in these pools is smaller than the Curve pool and more concentrated as this is more accessible to bootstrap than a broader liquidity distribution.

The higher the amplification of the Curve pool, the more uniform and fatter-tailed the distribution of trade prices executed is. The reason for this is that unincentivized pools generally concentrate liquidity around the rump of the trading range. When amplification is high there is relatively less liquidity in the tails to absorb flows in this region. Higher amplification in the Curve pool also broadens the concentration of liquidity in the Uniswap and Maverick pools.

### Chapter 5

## Recommendations

Ideally, stablecoins have deep, narrow stablecoin liquidity near the peg yielding significantly more from swap fees. The highly concentrated nature of these liquidity positions allows them to capture most of the volume in normal conditions. These pools should not require extra incentives for liquidity providers and if calibrated well the base fee should attract the right amount of liquidity for a stablecoin organically.

These highly concentrated positions run a high risk of being drained as their bonding curves do not adjust much to changes in price and therefore do not incentivize rebalancing. **There also needs to be less concentrated pools that create price discovery across a broader range of prices**. These pools also need deep liquidity to ensure reasonable slippage across their entire range. Because these less concentrated, but crucial pools generate relatively low swap fees and require high TVL, their swap yields will be low and hence require incentivization.

#### **1** Liquidity Distribution

An essential aspect in most efficiently maintaining functioning secondary markets appears to be creating deep, concentrated liquidity around the likely trading range that does not allow for arbitrage to minimize slippage and hold prices in this range as much as possible. There should also be sufficient broad liquidity to ensure that should something happen that prohibits arbitrage from restoring the peg with the primary market, price discovery can still occur, and reasonable trading conditions remain.

Thus, The broad liquidity pool needs a fee in line with the concentrated pools to be competitive in normal conditions.

All stablecoins use an incentivized Curve pool. The configuration of this pool affects all other liquidity sources. Choosing a lower amplification will likely lead to more concentrated liquidity elsewhere. There also appears to be evidence that this creates a more normally distributed range of executed prices.

#### 1.1 Liquidity Pool Initialization Recommendations

• Seed and incentivize a primary liquidity pool on a DEX that allows this and has a stableswap or equivalent bonding curve. The amplification coefficient should start low, around 50, and ramp up to 200 once price stability and normal trading commences.

This should be high enough to be efficient, while low enough to leave enough liquidity further from peg.

- Seed concentrated liquidity pools on Uniswap v3 and Maverick Protocol. These should cover the likely ETH-stETH price range arbitrageurs can access [-16bps, 4bps] and a little more. Something like [-30bps, 10bps] should suffice. Over time these should attract LP capital naturally.
- The width of the price ranges on the Maverick pool could wide, 10bps for example, like Liquity so as not to be too concentrated. Less, but wider ranges are also simpler for LPs to administer.
- Because USDe is likely to trade with a little more volatility around peg (at least initially), creating these pools with 4bp fees is advisable. This will also help bootstrap natural liquidity.
- Most seed liquidity will likely be needed in a broad stableswap type (Curve or Balancer) liquidity pool to ensure the full price range is covered from the start.
- Over time, let the market price the amount and range of concentrated liquidity while deliberately subsidizing lesser used but underpriced by the market broad liquidity.

# Appendix A

# Stablecoin Dex Volume Breakdown

Token Pair	Uniswap	Curve	Maverick	Balancer	Other
USDC-USDT	23%	20%	25%	0%	32%
DAI-USDT	13%	44%	0%	1%	42%
DAI-USDC	52%	26%	19%	2%	1%
FRAX-USDC	12%	88%	1%	0%	0%
LUSD-USDC	37%	43%	19%	0%	0%
TUSD-USDT	0%	17%	0%	0%	82%
DOLA-USDC	0%	60%	0%	40%	0%
FRAX-USDT	36%	64%	0%	0%	0%
LUSD-USDT	0%	100%	0%	0%	0%
MIM-USDC	3%	97%	0%	0%	0%
MIM-USDT	0%	100%	0%	0%	0%
GUSD-USDC	34%	66%	0%	0%	0%
BUSD-USDT	67%	30%	0%	0%	3%
sUSD-USDC	3%	94%	0%	0%	3%
DAI-FRAX	57%	43%	0%	0%	0%
DAI-LUSD	6%	94%	0%	0%	0%
BUSD-USDC	68%	30%	0%	0%	1%
DAI-sUSD	0%	98%	0%	0%	2%
sUSD-USDT	0%	96%	0%	0%	4%
<b>GUSD-USDT</b>	0%	100%	0%	0%	0%
USDD-USDT	86%	14%	0%	0%	0%
ALUSD-USDC	0%	100%	0%	0%	0%
PAX-USDC	0%	100%	0%	0%	0%
DAI-MIM	0%	100%	0%	0%	0%
TUSD-USDC	3%	97%	0%	0%	0%
OUSD-USDT	26%	57%	17%	0%	0%
FRAX-sUSD	92%	8%	0%	0%	0%
DAI-GUSD	0%	100%	0%	0%	0%
PAX-USDT	0%	100%	0%	0%	0%
DOLA-FRAX	0%	100%	0%	0%	0%

Table A.1: 3Q23 Average Stablecoin Pair Volume Breakdown by DEX

DAI-PAX	0%	100%	0%	0%	0%
MAI-USDC	0%	98%	0%	2%	0%
DAI-TUSD	0%	100%	0%	0%	0%
OUSD-USDC	0%	100%	0%	0%	0%
USDC-ZUSD	39%	61%	0%	0%	0%
ALUSD-FRAX	17%	83%	0%	0%	0%
<b>BUSD-DAI</b>	0%	98%	0%	0%	2%
DAI-FEI	19%	81%	0%	0%	0%
USDC-USDD	0%	100%	0%	0%	0%
MIM-USDD	100%	0%	0%	0%	0%
<b>BOB-USDC</b>	100%	0%	0%	0%	0%
BOB-USDT	100%	0%	0%	0%	0%
FEI-USDC	6%	94%	0%	0%	0%
BEAN-USDC	0%	100%	0%	0%	0%
ALUSD-DAI	0%	100%	0%	0%	0%
BEAN-USDT	0%	100%	0%	0%	0%
FEI-USDT	0%	100%	0%	0%	0%
FRAX-MAI	0%	100%	0%	0%	0%
DAI-OUSD	0%	100%	0%	0%	0%
ALUSD-USDT	0%	100%	0%	0%	0%
FRAX-LUSD	0%	100%	0%	0%	0%
PAX-TUSD	100%	0%	0%	0%	0%
USDC-USDP	0%	100%	0%	0%	0%
mUSD-USDC	0%	98%	0%	2%	0%

Token Pair	Uniswap	Curve	Maverick	Other
FRAX-USDC	16%	84%	0%	0%
DAI-USDC	34%	65%	0%	1%
USDC-USDT	20%	74%	1%	5%
DAI-FRAX	32%	68%	0%	0%
DAI-USDT	1%	97%	0%	2%
FRAX-USDT	9%	91%	0%	0%
MIM-USDC	0%	100%	0%	0%
MIM-USDT	0%	100%	0%	0%
DAI-MIM	0%	100%	0%	0%
ALUSD-FRAX	1%	99%	0%	0%
sUSD-USDT	0%	100%	0%	0%
DAI-sUSD	0%	100%	0%	0%
ALUSD-USDC	0%	100%	0%	0%
sUSD-USDC	0%	100%	0%	0%
DAI-LUSD	1%	99%	0%	0%
LUSD-USDT	0%	100%	0%	0%
LUSD-USDC	15%	65%	9%	10%
ALUSD-DAI	0%	100%	0%	0%
ALUSD-USDT	0%	100%	0%	0%
BEAN-USDC	0%	100%	0%	0%
BEAN-USDT	0%	100%	0%	0%
BOB-USDC	100%	0%	0%	0%
DOLA-FRAX	0%	100%	0%	0%
TUSD-USDT	0%	25%	0%	75%
DOLA-USDC	0%	100%	0%	0%
BOB-USDT	100%	0%	0%	0%
USDD-USDT	87%	13%	0%	0%
OUSD-USDT	19%	70%	8%	3%
FRAX-sUSD	96%	4%	0%	0%
OUSD-USDC	0%	100%	0%	0%
DAI-OUSD	0%	100%	0%	0%
USDC-ZUSD	53%	47%	0%	0%
DAI-TUSD	0%	100%	0%	0%
USDC-USDP	0%	100%	0%	0%
GUSD-USDT	0%	100%	0%	0%
DAI-GUSD	0%	100%	0%	0%
MAI-USDC	0%	100%	0%	0%
FRAX-MAI	0%	100%	0%	0%
GUSD-USDC	15%	85%	0%	0%
TUSD-USDC	0%	100%	0%	0%
BUSD-USDT	33%	67%	0%	0%
BUSD-DAI	0%	100%	0%	0%
USDC-USDD	0%	100%	0%	0%
BUSD-USDC	14%	86%	0%	0%

Table A.2: 3Q23 Average Stablecoin Pair TVL Breakdown by DEX

PAX-USDT	0%	100%	0%	0%
DAI-PAX	0%	100%	0%	0%
PAX-USDC	0%	100%	0%	0%
mUSD-USDC	0%	99%	0%	1%
DAI-FEI	4%	96%	0%	0%
FEI-USDC	3%	97%	0%	0%
FEI-USDT	0%	100%	0%	0%
FRAX-LUSD	0%	100%	0%	0%
MIM-USDD	100%	0%	0%	0%
PAX-TUSD	100%	0%	0%	0%

### Appendix B

# About Chaos Labs

Chaos Labs is a cloud-based platform that develops risk management and economic security tools for decentralized finance (DeFi) protocols. The platform leverages sophisticated and scalable simulations to stress test protocols in adverse and turbulent market conditions. By partnering with DeFi protocols, Chaos Labs aims to create innovative solutions that enhance the efficiency of DeFi marketplaces.

The Chaos Labs team exhibits exceptional talent and represents diverse expertise, encompassing esteemed researchers, engineers, and security professionals. Chaos Labs has garnered its experience and skills from renowned organizations, including Google, Meta, Goldman Sachs, Instagram, Apple, Amazon, and Microsoft. Additionally, the team boasts members who have served in esteemed cyber-intelligence and security military units, further contributing to their unparalleled capabilities.

You can explore our past and ongoing projects for customers like Aave, GMX, Benqi, dYdX, Uniswap, Maker, and more in the Research and Blog sections of our website.