



# STARDUST

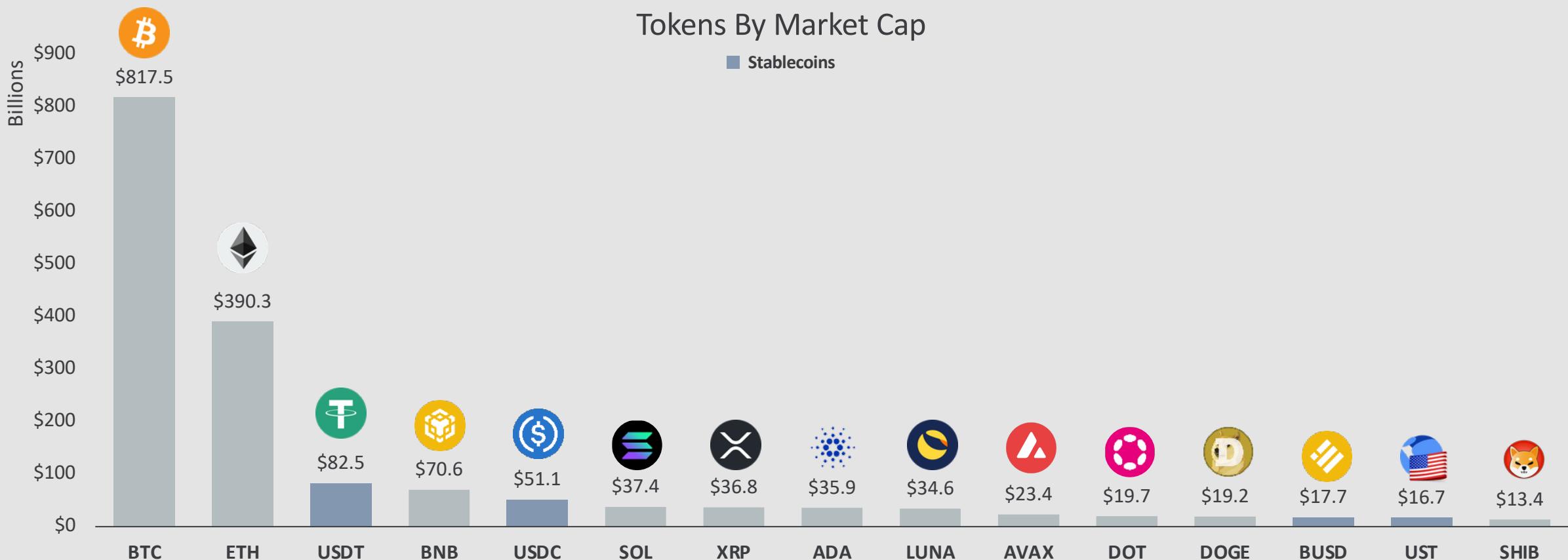
State of the Stablecoin Industry

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Today, a plethora of stablecoins have found commercial success and have gone on to become one of the cornerstones of the modern crypto ecosystem.

Stablecoins today have a combined market cap of \$170B+ and are amongst the largest tokens.



Extant stablecoins fall into one of three categories; centralized issuers collateralized by fiat custody, decentralized issuers with overcollateralized tokens, or algorithmically managed coins.



tether



Ampleforth

### Centralized, Custodied

These were earliest version of stablecoins, where a user gave custody of their assets to a third party who provided them an equivalent value in on-chain tokens. These tokens can always be redeemed for an equivalent amount of the original assets.

### Limitations

Requires trusting your assets to a centralized third party and requires a well regulated environment to ensure the collateral is legally maintained and accessible.

Subject to higher costs for some assets such as gold which require additional handling and storage costs.

### Decentralized, Collateralized

These stablecoins are decentralized smart contracts that maintain excess collateral, typically a pool of other tokens, that back the value of its issued token. As users provide collateral, they are issued tokens on-chain which can be redeemed for the original collateral. If the collateral value falls, a user's position might be liquidated.

Most tokens are backed by pools that ultimately are just baskets of centralized, custodied stablecoins. DAI for example is pre-dominantly backed by USDC.

If the collateral a user has provided falls in value, they can be liquidated and will incur heavy fees.

### Algorithmically

The latest innovation in stablecoins. Algo coins maintain price parity to a peg by either minting or burning currency similar to a central bank. They monitor the relative price to the peg through oracles that report the price on exchanges or attestations from their validators.

While stable in inflationary regimes, managing the stability during demand contractions is extremely challenging and multiple projects have failed.

To date, algo coins have not demonstrated a consistently reliable ability to maintain stability through shocks.

Custodied coins are the oldest architecture. The first stablecoin commercially deployed was Tether. Originally named “Realcoin”, it launched on the Bitcoin Omni layer in 2014.

Tether experienced massive growth thanks to the Ethereum Network and is the largest stablecoin by market cap.



Tethers offer several notable advantages which has led it to dominate the ecosystem.

#### Fiat Backed Stability:

Tethers are ostensibly backed 1:1 with USD, and can be redeemed for those fiat dollars. That backing has led to unmatched stability since inception.

#### First Mover Advantage & Long Track Record:

Tether was first on the market during the infancy of cryptocurrency development. It now has 7 years of commercial history demonstrating the resilience and stability of its smart contracts and operations.

#### Widely Available:

Tether is available on multiple blockchains in a native format and is available on nearly every other as a wrapped token.

Since then, centralized, custodied stablecoins have all functioned similar to this original implementation by Tether.

#### Off-Chain Minting and Redemption Processes



During the minting process a user transfers an asset such as fiat dollars (USD) over to a centralized third party like Circle that takes custody of those assets. In exchange Circle issues an equivalent amount of tokens on the ledger, in this case ERC-20 USDC tokens on the Ethereum Network.



During the redemption process a user returns those ERC-20 USDC tokens to the issuing party, in this case Circle, in exchange for an equivalent amount of the pegged currency.

#### Example Projects (Market Cap Jan 2022)



Different assets can be custodied such as gold or other commodities, however only USD projects has seen widespread adoption or success thus far.



### Fiat - USDT, XSGD, EURS

Fiat custody was the very first implementation. Stablecoins exist for most world currencies and are usually pegged 1:1 by fiat dollars in a bank account.

### Limitations

Most of these companies are under increasing regulatory scrutiny for their practices. Fiat currency is subject to the legal and regulatory jurisdiction of its issuing country.

To date, only one fiat currency has seen widespread adoption with 99%+ of the custodied stablecoin market based on USD.



### Gold – PAXG, XAUT

The only significant commodity backed tokens are gold backed. PAX or Tether purchase and store gold on the users behalf and can be redeemed at anytime for gold.

Gold requires physical ownership, intense security measures, and must be checked for purity and validity.

These result in an ongoing cost for storage and maintenance of gold reserves. Which when combined with gold's inability to be deployed in interest generating loans results in high operating costs.



### Others – Oiler, Landshare, SRC

Other commodity-backed tokens are still highly experimental. Many projects are focusing on tokenizing real estate or oil and are currently in development.

There is a difficulty in managing real world assets exclusively through smart contracts and today requires significant manual underwriting and management.

In addition, non-fungible, illiquid commodities such as real estate present significant capital management challenges when used to back a pool of fungible tokens.

Custodied stablecoins like Tether have a centralized point of failure, and several projects have attempted to decentralize collateralized stablecoins through smart contracts such as DAI.

#### Generalized On-Chain Minting and Redemption Processes



During the minting process a user places collateral such as PETH (Pooled Ether) inside of a smart contract. In exchange the smart contract records the user as having provided that collateral and issues a commensurate amount of tokens, generally at a significant discount to the collateral.



When redeeming, a user returns the DAI and their collateral is released back to them. If a user's collateral drops in value below the reserve ratio relative to their DAI at any point, the smart contract liquidates their collateral through a Dutch Auction where users bid to buy the collateral with DAI.

#### Example Projects (Market Cap Jan 2022)

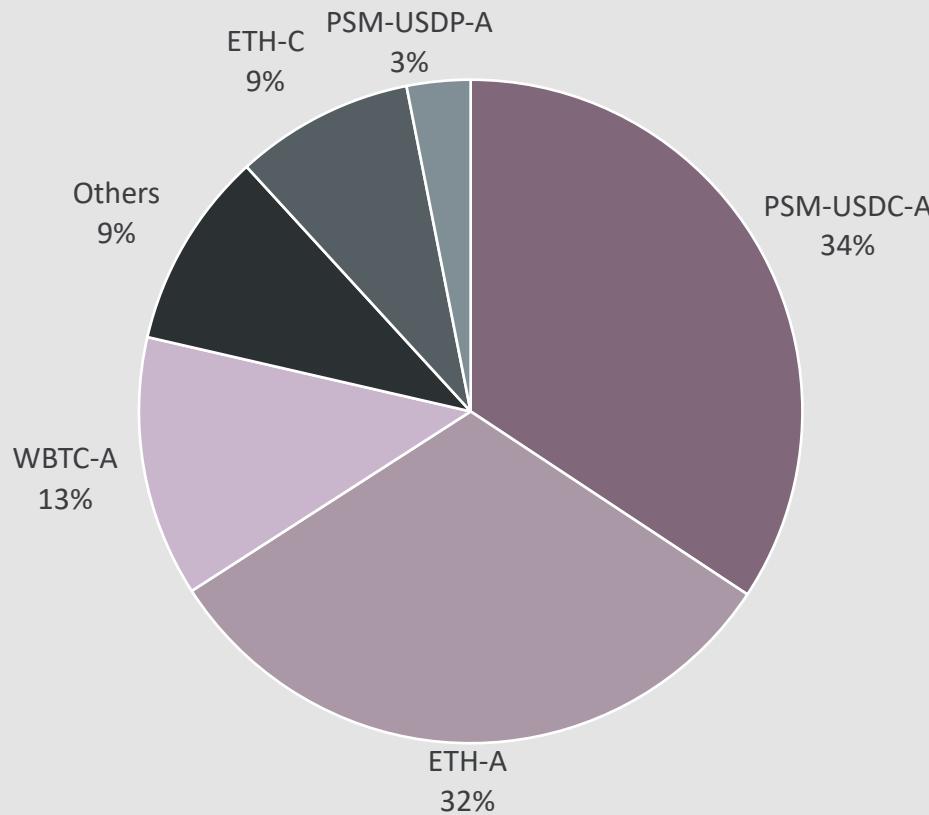


# Reserve

2020  
\$28.7M USD

Decentralized, collateralized coins are backed by a basket of on-chain assets. As all assets are 100% on chain, their collateral is publicly accessible and can be quickly liquidated if need be.

DAI Collateral Breakdown



Summary

**Sizable Collateral Pool:**

\$15.8B is currently locked up as collateral to back DAI. Collateral requirements vary depending on the underlying asset, so even though USDC is only 34% of collateral, its marginal 1% overcollateralization ratio means that USDC backs 53% of outstanding DAI issued.

**Heavily Over-Collateralized:**

While modern commercial banks loan out nearly 90% of their holdings, DAI maintains a collateralization ratio of 161% so it only effectively loans out about 62% of its collateral. The rest remain locked in storage and uninvested.

**Inability to Deploy Capital Effectively:**

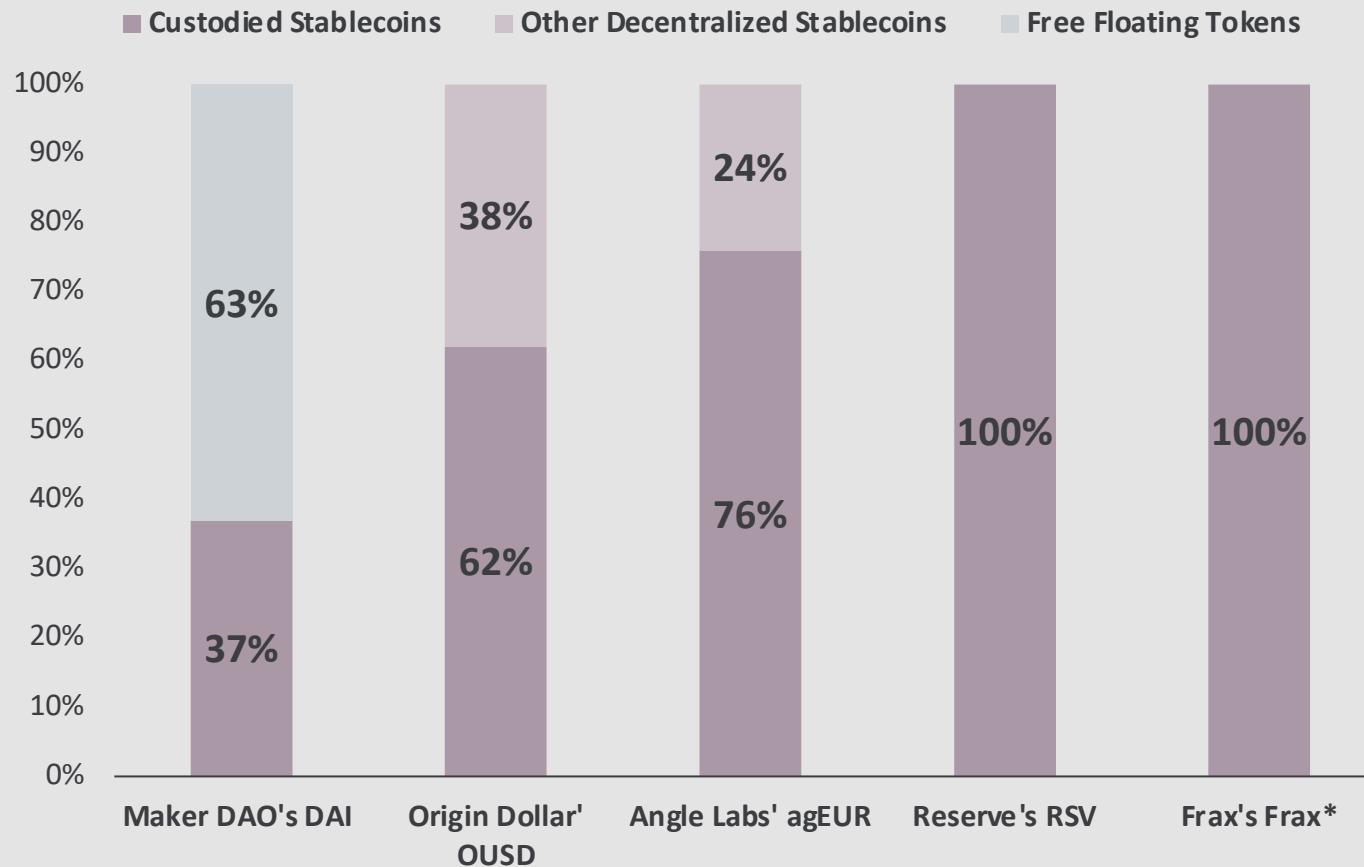
As the smart contract cannot effectively deploy the collateral, the interest rate paid on the collateral to the users who have provided it, is currently 0.10%, which is itself an increase over the 0.00% it was for most of 2020.

**Ultimately Leading to Inefficient Capital Allocation:**

Ultimately the structure of decentralized stablecoins such as DAI requires significant dead capital. DAI's over-collateralization and inability to allocate capital to more efficient uses alone bottlenecks nearly \$16B of capital, or a \$438MM loss every year even if only deployed at Ethereum's risk free rate of 2.73%.

A significant portion of these collateral assets are other stablecoins meaning these tokens have significant risk exposure to each other and their custodied cousins.

Decentralized Stablecoin Collateral Pool Compositions by Asset Type



## Market Dynamics

### Cross-Correlation Risks:

Most collateralized, decentralized coins are actually backed by either their peers or custodied centralized coins. Any volatility would quickly spread throughout the ecosystem. As an example, DAI has strong exposure to both USDC and ETH prices. Their high collateralization rate on ETH of 161% provides the ability to absorb significant shocks, however if the price of Ethereum fell 60%, DAI would be forced to liquidate some positions and possibly slip their peg. Once DAI's peg fell, that would also compromise the stability of agEUR and OUSD which have 24% and 38% exposure to DAI respectively.

### Deceptive Decentralization:

Some tokens like Reserve or Frax which are 100% backed by custodied coins are fully subject to sanctions and government regulations. If either fell afoul of local laws, they would be unable to withdraw or transact with their USDC as they are bound by the terms and conditions of Circle.

\*Frax is an algorithmically managed coin, but it is partially collateralized, this is a breakdown of that collateral.

To solve this issue of interdependence, the newest generation of stablecoins have no collateral and instead algorithmically manage money supply to ensure a stable price.

# Ampleforth

## Rebasing

The very first algorithmic stablecoins used the concept of "rebasing". Here, the smart contract re-adjusts every wallet's balance after a fixed period in order to keep the price close to the peg based on exchange data from either its validators or a third-party oracle.

## Limitations

Rebasing creates a token with a stable price to the peg, but it doesn't allow for a wallet to maintain a stable value. Any wallet holding one of these stablecoins simply gains or loses tokens to maintain the price, meaning they still experience all the price fluctuations of the market. As an example, if the coin loses half its value, the algorithm simply burns half the coins in every wallet to stabilize the price. While the price will stabilize back at the peg, every wallet has lost  $\frac{1}{2}$  its value.



## Multi-Token

This stability mechanism is the closest analog the distributed ledger ecosystem has to modern monetary supply management. Similar to a central bank, these coins manage supply by minting "shares" tokens to increase token supply and using "bonds" tokens to buy back shares to decrease token supply.

SEC regulations and legal scrutiny made some projects untenable and resulted in Basis failing to deliver a commercially feasible product.

Several large projects using this methodology have failed in the past few years such as TITAN and IRON. Recently, Neutrino slipped its peg and struggled to recover.



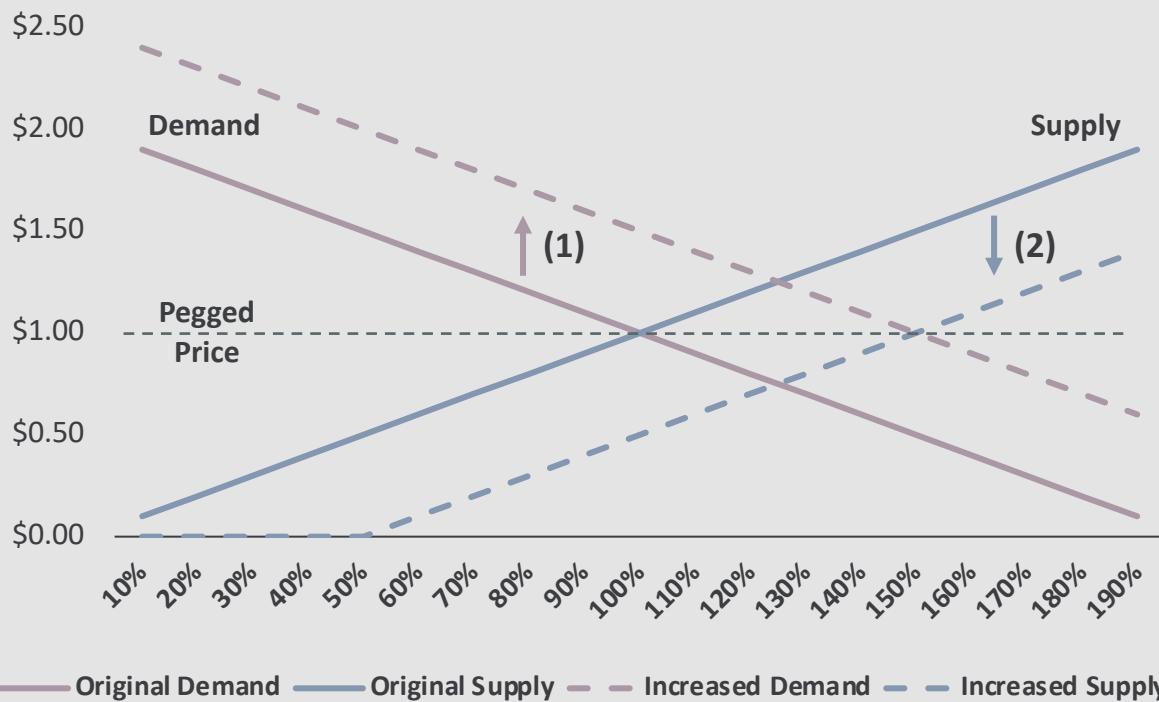
## Fractional-Algorithmic

FRAX and other fractional reserve stablecoins employ a hybrid strategy combining the methodology of an algorithmic stablecoin with the additional security of a collateral pool. This allows these coins to reduce their collateral needs while still allowing them to manage supply to maintain stability.

While combining the best of both collateralized and algorithmic stablecoins, it also inherits some of the limitations of each. These coins still require large amounts of dead capital, in FRAX it is 50% of the overall circulating supply, and it opens up cross correlation risks. In terms of algorithmic limitations, FRAX is still reliant on Oracles and external sources of information which can be gamed by miners or oracles.

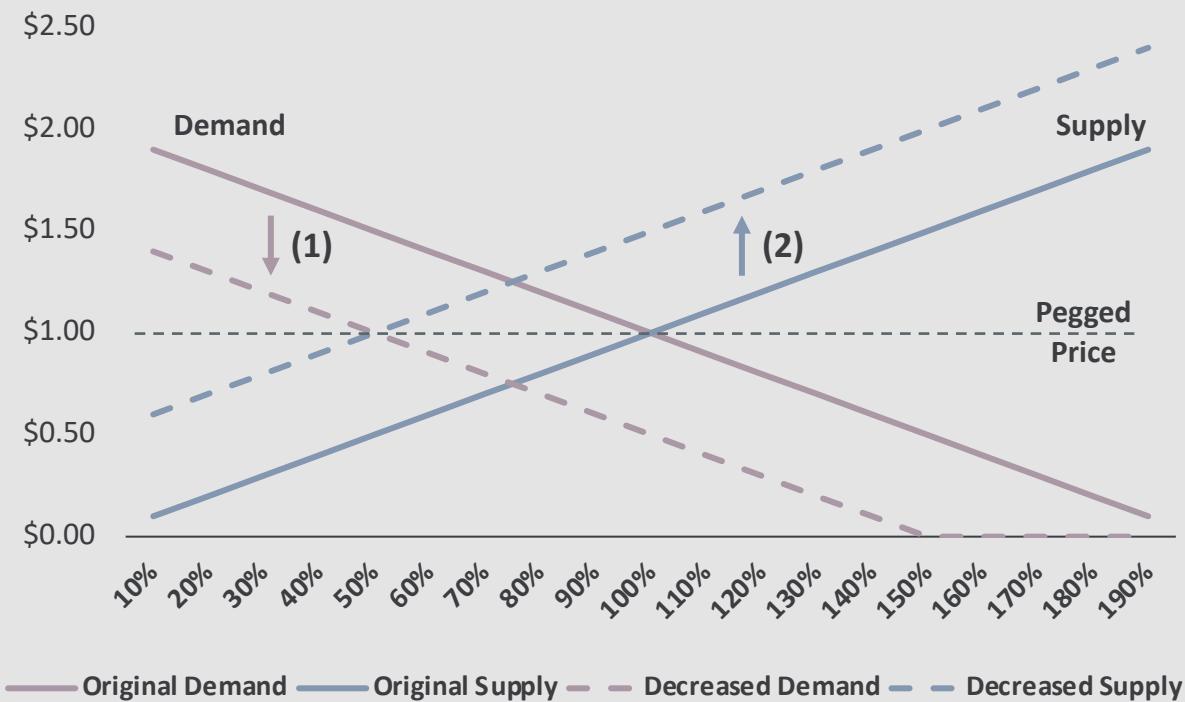
# All algorithmic stablecoins are an attempt to manage supply and demand to ensure a consistent peg to a reference currency.

When Demand increases (1), the algorithm mints tokens and injects them into the market increasing Supply (2).



Here demand for the stablecoin has increased, illustrated as movement (1). Naturally, this would tend to increase prices, however the algorithm instead increases the overall token supply, illustrated as movement (2). This is trivial to execute as tokens can simply be printed and deployed through open market operations on DEXs and other exchanges.

When Demand contracts (1), the algorithm burns tokens and removes oversupply from the market (2).



Here overall demand for the stablecoin has decreased, illustrated as movement (1). Naturally, this would tend to decrease prices. In order to maintain the pegged price, the algorithm decreases the overall token supply, illustrated as movement (2). This is significantly more difficult to execute as the tokens are in the market and are not easily accessed for destruction.

The first algorithmic model implemented, **rebasing**, is the most straightforward. As supply and demand deviate from the peg, the smart contract burns or mints tokens in every account equally.



If the price on oracles exceeds the target price at the end of the rebase period, the Ampleforth smart contract initiates a “rebase” which is where every wallet balance in the global state has its account balance increased therefore increasing supply.



If the price on oracles is below the target price at the end of the rebase period, the Ampleforth smart contract initiates a “rebase” decreasing all account balances and therefore decreasing overall supply.

**Summary**

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**A Wallet’s Share of Market Cap is Stable Through Rebases:**  
Provided that exchanges update their prices quickly enough, a rebase shouldn’t affect the value in a wallet during through the instance of a rebase. This model is best thought of as holding a certain % of the market cap, and during a rebase, any changes to the price are directly accompanied by a change in the overall supply during a rebase.

**Users Still Hold Currency Risks:**  
Note however this doesn’t mean portfolio values are stable overtime. Market forces still affect the overall **market cap** which is the primary determinant of the portfolios value. Ampleforth has experienced strong movements in market cap over time with large resulting impacts to users wallets.

**Reliant on Oracles:**  
In order to accurately assess the prices, the smart contract relies on external inputs for the market price, either oracles or validators.

**MEV/Oracle Extractable Value:**  
As rebasing relies on Oracles for exchange rates, and the possibility that some exchanges might not immediately update their rates, large arbitrage opportunities exist in the block that a rebase occurs and a malicious miner can quickly profit from these discrepancies.

# In rebasing schemes, users are still exposed to any and all currency risk. This leads to negative experience if a user is expecting an asset that retains a stable value, not necessarily a stable price.

## Users struggle to understand rebasing

Posted by u/xray404 11 months ago

### Losing value over time ?

Hi, I thought I understood how Ampleforth worked but after some time things don't look like I would expect them too. I bought some AMP at an average price of 0.62\$ during the last dip, now the price is above 0.7\$ but the total worth of my stack is less than what I put initially. I'm aware of the rebasing but I didn't think about a scenario where the coin would lose value as its price actually goes up.

Does that mean that my investment will continuously lose value as long as AMP is under 1\$ ?

And how do you keep track of the real value of your stack ? If numbers keep changing, you can't use the ~~number of AMP you have as a reference and you can't use the USD value neither since I obviously los~~



Bolavet1 · 2 yr. ago

They took 540 ampleforth from my kucoin account, I don't know what to do

1

Rebasing is incredibly difficult for users to understand as it is largely focused on price stability not the asset value stability. While price and asset value are often inextricably tied and therefore conflated in the real world, in the world of smart contracts, normalizing the balance of a token is of trivial difficulty and allows anyone to rebalance global account values in moments to maintain price stability. This doesn't prevent users from being exposed to shocks in the asset price as it simply gets reflected in the overall balance of tokens in their account which either increase or decrease based on overall demand.

## It also is incredibly complex for accounting



xray404 OP · 11 mo. ago

I see, it looks like a nightmare to do your tax return on this coin. There is something else I don't get, so when we're above 1\$ the supply is expanded meaning that your USD value goes up as long as we stay above 1\$ and the opposite for under 1\$, USD value keeps getting lower. Knowing that why would anyone buy the coin when it's under 1\$ ? Imagine I buy 10k worth of AMPL at 1\$ then we enter a months long bear market and the coin stays under 1\$ for 6 months. When we finally get back to 1\$ my stack is worth, lets say, 5k now, I don't know the full math. Then we go above 1\$ and the supply starts to expand again but it will take months before I get back to the 10k worth and start making profit after.

Is this correct ? if so, what is the incentive to buy under a 1\$ ? Sure you get more of the total supply but in terms of USD value, the longer we spend under 1\$ the less chances you'll have to make any profit.

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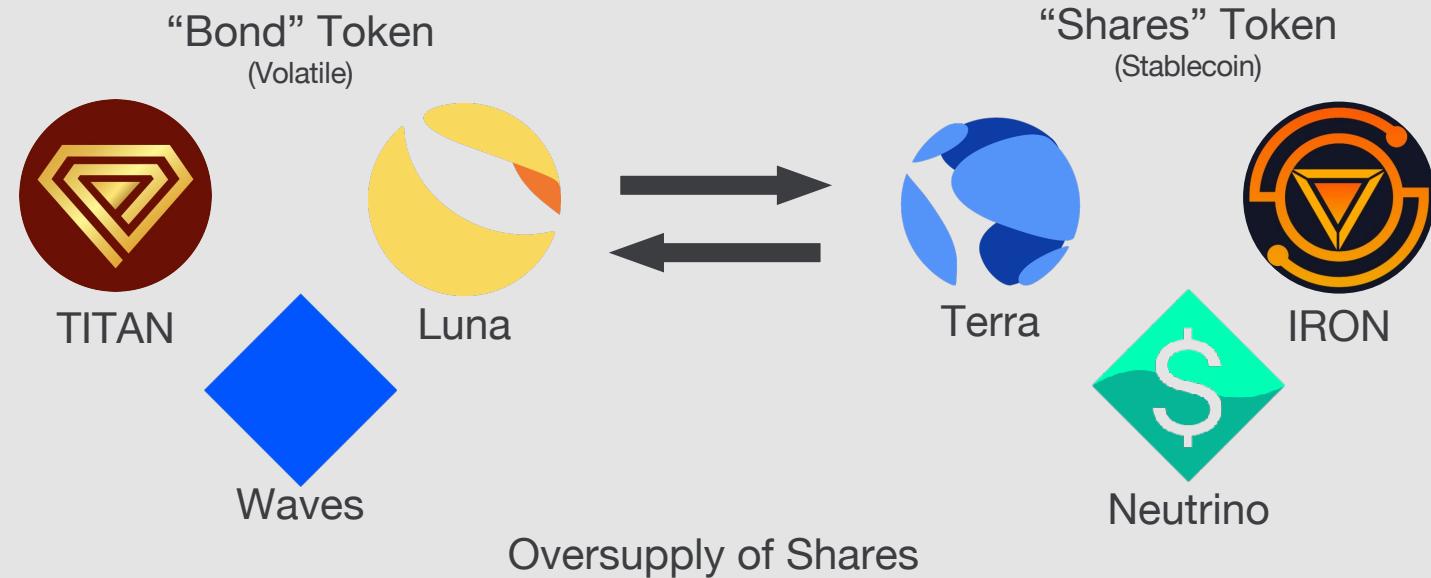
Attempting to properly account for a rebasing asset like Ampleforth is incredibly difficult as there is no equivalent framework in traditional markets or accounting fields. Ultimately, it is possible that every rebase would have to be qualified as a taxable event. While not impactful for the average user, large corporations would struggle to adopt it and incorporate any significant holding of a rebasing token on their balance sheets.

A more recent alternative is the **multi-token** model, where similar to central-banks, “shares” and “bonds” are issued to either increase supply or buyback oversupply through open market operations.

### Stability Mechanism

#### Undersupply of Shares

During periods of undersupply, bond token holders, ex. Luna, are incentivized to burn their tokens to mint the stablecoin, ex. Terra (UST).



During periods of oversupply, stablecoin holders, ex. Terra (UST), are incentivized to burn their stablecoins to mint the bond token, ex. Luna

### Summary

#### Currency Risk Is Theoretically Segregated:

The logic behind this model is that the store of value stablecoin, ex. Terra, is now insulated from demand/supply shocks which will theoretically be absorbed by the bond token price, ex. Luna.

#### Assumes Demand for The Underlying Bond Token:

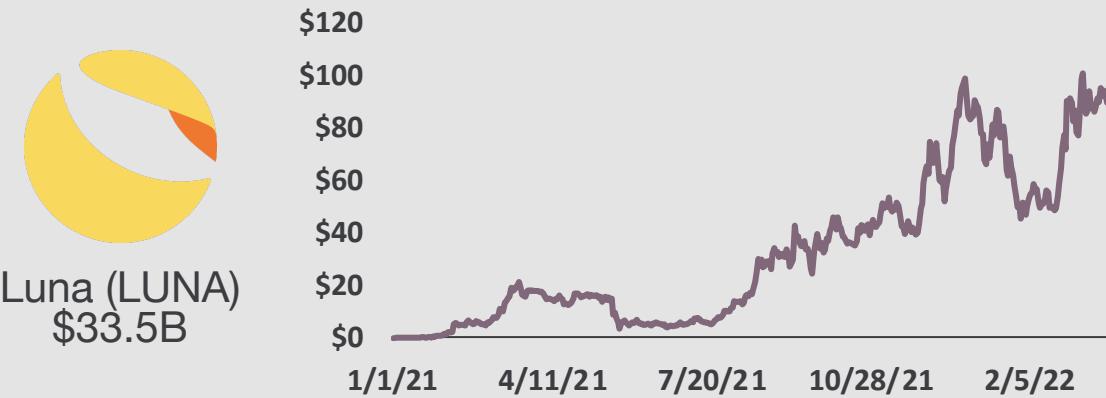
While there is no collateral for either token, Terra is unique in that Luna as it is the native token of Terra's layer 1 blockchain and is necessary to pay gas fees on the network.

#### Very Susceptible to Hyperinflation:

In an extreme example, IRON, a stablecoin developed by Iron Finance implemented a version of this model with their second token TITAN. As they are both simple ERC-20 tokens, there is no inherent utility and as such lacked a base demand level. When a few of the largest TITAN holders liquidated a portion of their holdings, it snowballed into a run on the token. Without intrinsic demand, the currency quickly loses its ability to maintain its price, further destabilizing in a runaway effect. Titan today trades at \$0.0000001461 USD from its high of \$61.23. This effect is analogous to runaway hyperinflation in traditional banking markets. Recently Neutrino, one of the largest stablecoins has slipped its peg for similar reasons.

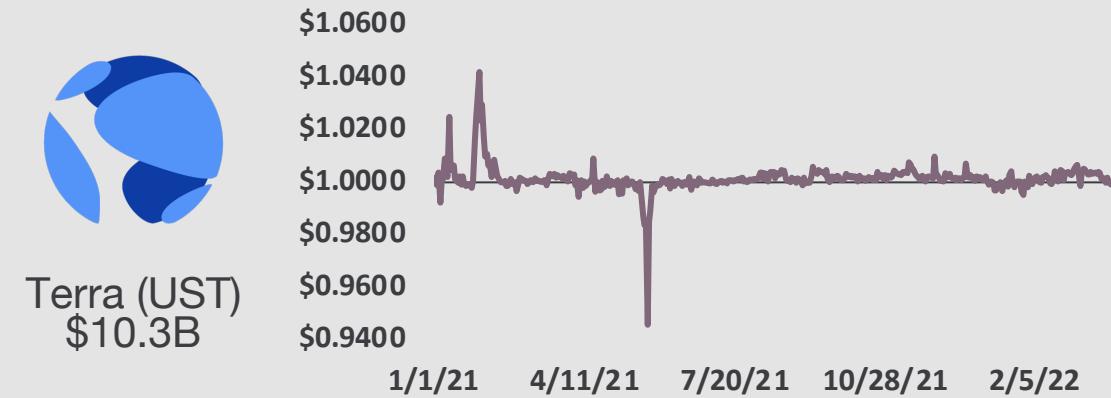
Most notable among these coins is Terra, a Cosmos based layer 1. Their native token (Luna) grew its market cap to **\$33.05B** and their stablecoin (Terra) grew to **\$10.13B** in just one year.

Luna (LUNA) is used as the Layer 1's native token.



A key difference between Terra's model and that of Iron or Neutrino is that Luna has intrinsic demand as the native token of a rich ecosystem with lots of DeFi applications that incur significant amounts of gas. This establishes a demand floor for Luna that makes it more unlikely that the price of Luna will completely collapse. However, you can see a drop in price on May 18, 2021 as Luna lost 2/3 of its value attempting to correct Terra slipping its peg.

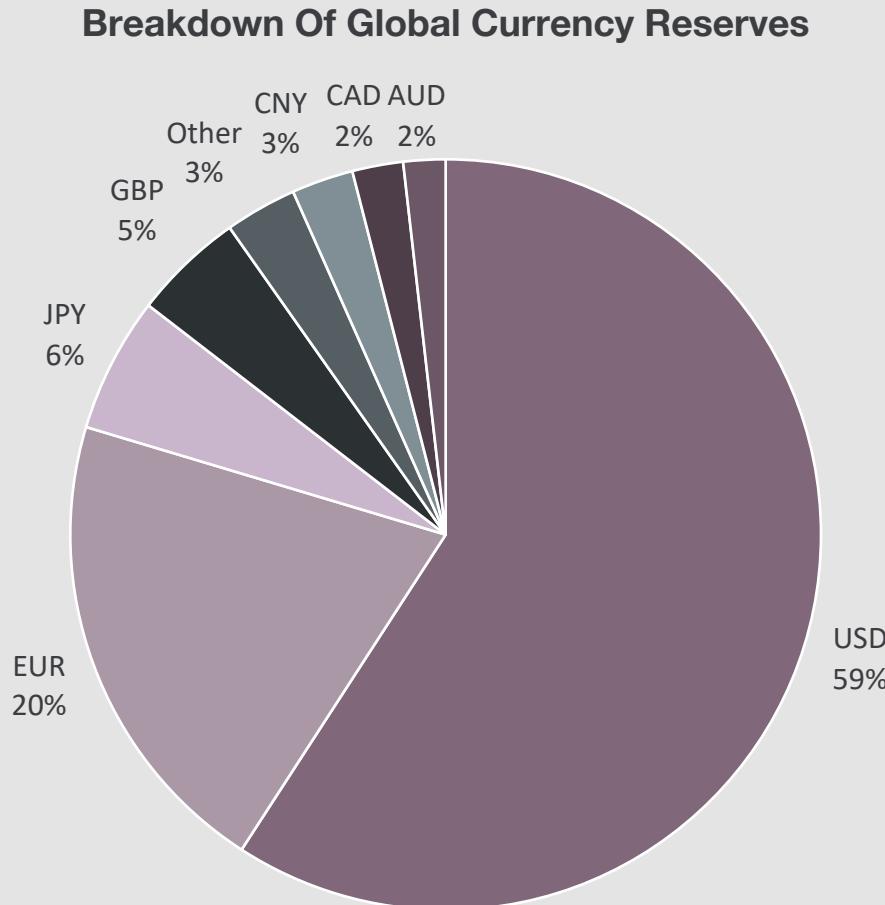
Terra (UST) is their Stablecoin pegged to the USD.



Terra has grown exponentially in 2021 primarily thanks to Anchor, Terra's native lending pool. Anchor promised 20% yield on UST which has proven to be a rather reliable stablecoin. These high yields and attractive stability saw massive demand and a flood of new users in the past 6 months. Unlike most lending pools, Anchor is deploying reserves from Terra's treasury in order to artificially inflate its APR, in the long run most estimate its stable APR to be similar to other DeFi platforms at 3-4%. However its 5x yields at the moment have allowed it to far outgrow any competitors.

Poor fiscal policy and management could lead to runaway hyperinflation like with TITAN. One proven backup prevention mechanism is to maintain foreign exchange reserves.

## Foreign Reserves Serve as a Backstop to Prevent Hyperinflation



## Summary

### Hyperinflation Prevention:

As a rule, the primary tool Central Banks use to prevent hyperinflation is careful monetary policy and diligent management of the overall money supply. Central Banks extensively measure the development and growth of their economy and align money supply and demand to maintain a stable inflation rate.

### Foreign Exchange Reserves :

In order to prevent runaway inflation, a Central Bank will maintain a basket of foreign currencies, e.g. the US's central bank issues USD and holds EUR and the EU's central Bank issues EUR and holds USD reserves. The amount each central bank holds in foreign exchange is a complex decision, with notable drivers being the country's overall economy size, stability of the local currency, the economy's overall reliance on global supply chains, and it's ratio of export to imports, along with dozens of other factors.

### Deploying Foreign Exchange Reserves :

Foreign Exchange Reserves can be deployed by a Central Bank through open market operations to buy back its own issued currency using the foreign currencies. In effect, this reduces money supply and allows the central bank to manage the currency supply during periods of demand contraction.

In order to further insure against the same dynamics that doomed TITAN, Terra recently has begun to build a Foreign Currency Reserve of Bitcoins.

As of writing they have announced raising a basket of \$10B

Do Kwon 🌟 ✅  
@stablekwon

...  
\$UST with \$10B+ in \$BTC reserves will open a new monetary era of the Bitcoin standard.  
P2P electronic cash that is easier to spend and more attractive to hold #btc ⚡

5:07 AM · Mar 14, 2022 · Twitter for iPhone

1,512 Retweets 237 Quote Tweets 8,950 Likes

This is a prudent move with multiple benefits.

#### A Proven Defense to Hyperinflation:

While building and maintaining a foreign currency reserve to backstop a currency issued by a quasi-central bank is not exactly a new era or even an innovation in monetary policy, it has been proven by nearly a hundred years of history to offer additional options that help prevent hyperinflation.

#### Outsized Foreign Currency Reserve:

Relative to the current market supply of \$15.61B UST, \$10B USD of BTC is a sizable foreign reserve. However, without diversification, this **STRONGLY** ties the stability of the UST to BTC. In the event of large shocks to BTC prices, that would have an impact on the perceived stability of Terra. Generally, most large foreign reserve holdings are well diversified and composed of currencies issued by stable central banks. It remains to be seen if the Terra team is planning to diversify their holdings to a basket of diversified crypto currencies.

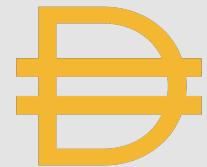
#### Effectively Functions as Collateral:

While reserves are not collateral and Terra is not redeemable for these BTC reserves directly, it does introduce the concept of hybrid, algorithmically managed, under-collateralized stablecoins.

This new Terra, along with Frax, are examples of hybrid models that combine algorithmic management of monetary supply with backing reserves, though they are undercollateralized.

## Hybrids Combine Algorithmic Management with Collateralized Reserves

## Summary

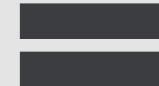


DAI

Collateralization

# + Ampleforth

Algorithmic Control



# Frax

Backed By USDC



# Sperax

Backed By USDT & USDC



# Terra

Backed By BTC

### More Efficient Capital Allocation:

As only a portion of the market cap is backed by collateral, these tokens are generally more capital efficient as they don't require users to tie up the full amounts of their assets. In addition, most do not allow direct redemption against reserves meaning that the bulk of the capital can be deployed on capital markets to generate additional interest with only a marginal amount held in liquid currencies for day to day operations.

### Algorithm and Governance:

By using an algorithm to determine supply and perform open market operations, the price can remain closely pegged without centralized, or human intervention.

### Partial Reserves Can't Fully Prevent a Run:

It's still possible for Frax and Terra to lose their peg as their tokens are not fully backed by collateral.

### Reserves Assets Incur Correlated Risks:

By backing their pool partially, they do create strong correlations with the underlying reserve assets, BTC in the case of Terra and USDC in the case FRAX. In the case of Terra for example, a drop in the price of BTC might change market sentiment and demand for UST which may require liquidating BTC at a loss leading to a price spiral.

# All of these different types of stablecoins make money in the same three ways; fixed fees for utilizing their token infrastructure, deploying their capital/collateral, and seigniorage.

## Fixed Infrastructure Fees

Most fiat backed stablecoins charge fees for verification, redemption and minting. Crypto-backed stablecoins charge similar fees, and if they are a layer 1 network, may charge additional network usage fees such as Terra's tax rate of 0.60% on every transaction.



Minimum fiat withdrawal or deposit <b>100,000 USD*</b>
Fee per fiat withdrawal <b>The greater of \$1,000 or 0.1%</b>
Fee per fiat deposit <b>0.1%</b>
Verification fee <b>150 USD in Tether Tokens</b>

This amount is non-refundable but can be part of your Redemption. The verification fee is intended to ensure that only those who are serious about establishing an account apply. The fee also helps offset a portion of the incurred costs from the execution of a robust verification process. To comply with applicable laws Tether maintains the sole discretion to approve or not approve accounts. By submitting a verification request you agree that the 150 USD deposit is non-refundable. Read carefully [here](#) before proceeding.

### Tether Fees

## Net Interest Margin

Many stablecoins deploy their locked collateral on the broader capital markets. This allows them to deploy that otherwise dead capital and generate interest returns. As most stablecoins don't pay interest or appreciate, this results in a net positive margin for the token issuer.

## DeFi Rate

	Compound v2	Aave	dYDX	Fulcrum	BlockFi	Nexo	Celsius	Gemini	Bitfinex	Poloniex	Coinbase
DAI	2.73%	1.5%	0%	6.6%	8.5%	4.6%	6.43%	—	9.13%	—	2%
USDC	1.88%	2.12%	0%	3.21%	7.25%	8%	7.1%	7.99%	—	5.11%	0.15%
ETH	0.08%	0%	0%	1.22%	4%	5%	5.35%	12.0%	6%	0.04%	—
BTC	—	—	—	—	4%	5%	5%	10%	0.04%	0.37%	—
WBTC	—	—	0%	0.55%	—	—	3.08%	—	—	—	—
USDT	3%	7.79%	—	5.17%	0.25%	8%	7.1%	—	—	4.93%	—
MKR	0%	0%	—	—	—	—	—	12.0%	7.35%	—	—
ZRX	0.39%	0.04%	—	—	—	—	1.77%	12.5%	2.4%	—	—
BAT	0.15%	0.11%	—	—	1.5%	—	7%	10%	—	—	—
TINCH	—	—	—	—	—	—	5.02%	3.5%	—	—	—
AAVE	4.17%	—	—	—	—	—	4.66%	10%	—	—	—
ADA	—	—	—	—	—	—	4.06%	—	0.8%	—	—
ALGO	—	—	—	—	—	—	—	—	—	—	—
AMPL	—	—	2.08%	—	—	—	—	—	—	4%	—
ATOM	—	—	—	—	—	—	—	—	—	0.8%	—
AVAX	—	—	—	—	—	—	8.3%	—	19.34%	—	—
BAL	—	—	1.53%	—	—	—	—	12.5%	—	—	—
BCH	—	—	—	—	—	5%	4.5%	8.12%	—	0.04%	—

Interest Rates by Token by Platform

## Seigniorage

Seigniorage is the difference between the value of money and the cost to produce and distribute it. As tokens cost virtually nothing to produce or distribute, algorithmic stablecoins receive 100% of their market cap as a profit.



US Mint Increasing Dollar Supply

# The most direct, ongoing profit drivers for stablecoins are assessed network fees. These can be for usage, minting, redemption or any ongoing or integration fees.

## Usage Fees

Some stablecoins such as Terra charge fees for any on-network actions with their stablecoins. In addition to the gas fees, any exchange involving either the creation, burn or trading of stablecoins on Terra incurs a cost through either a fixed "Spread fee" or a "Tobin tax".



### Fees on Terra

On the Terra network, all transactions incur a gas fee. Transactions involving stablecoins incur additional fees depending on the type of transaction being made. The following table explains which extra fee is added to the

#### Tobin tax

The Tobin tax is a fixed percentage fee added to any [market swap](#) between Terra stablecoin denominations. The rate varies depending on each Terra stablecoin. For example, while the rate for most

#### Market swap

stablecoins ha

#### Spread fee

Spread fees are added to any [market swap](#) between Terra and Luna. The minimum spread fee is .5%. During times of extreme volatility, the market module adjusts the spread fee to maintain a constant [Product](#) between the size of the Terra pool and the fiat value of the Luna pool, ensuring stability in the protocol. As the pools reach constant product equilibrium, the spread rate returns to a normal value.

#### All other trans

fees on top of

Every block, Tc report correct rewards. For m

For more information on spread fees, visit the [market module](#).

Every block, spread fees are sent to the [Oracle reward pool] and [dispersed to validators](#) that faithfully report correct exchange rates. Validators then distribute these fees to delegators in the form of staking rewards. For more information on the Oracle reward pool, visit the [Oracle module](#).

### Terra Network Fees

## Minting and Redemption Fees

Many networks also charge fees when you want to redeem their token in exchange for their custodied fiat currency or collateral. For example, Tether charges \$150 USD to become a verified account to deposit or withdraw fiat currency, both of which assess a 0.1% fee.



Minimum fiat withdrawal or deposit  
100,000 USD\*

Fee per fiat withdrawal  
The greater of \$1,000 or 0.1%

Fee per fiat deposit  
0.1%

Verification fee  
150 USD in Tether Tokens

This amount is non-refundable but can be part of your Redemption. The verification fee is intended to ensure that only those who are serious about establishing an account apply. The fee also helps offset a portion of the incurred costs from the execution of a robust verification process. To comply with applicable laws Tether maintains the sole discretion to approve or not approve accounts. By submitting a verification request you agree that the 150 USD<sup>T</sup> deposit is non-refundable. Read carefully [here](#) before proceeding.

### Tether Fees

## Ongoing Fees

Many also assess direct, ongoing integration fees for companies that integrate their solution. For example, Circle has a \$1,000/mo plan for companies that want to accept USDC payments. Redemption and payouts are an additional infrastructure cost of \$250/mo.



#### PAYOUTS

\$250/mo

Programmatic, fast and global payouts

#### DETAILS ^

##### USDC

\$25 per payout | \$50 per Wire Reversal  
Read more about [bank wires](#).

##### ACH (BETA)

.20% + \$.50 per successful transaction  
Read more about [ACH](#).

##### VISA PARTNER WALLETS

Coming soon

#### PAYMENTS

\$1,000/mo

##### USDC

One-stop-shop fiat and digital asset payments  
Read more about [card details](#).

##### CARD

2.9% + \$0.30 per transaction.  
+1% for cross-border transactions.  
Read more about [card details](#).

##### ACH

.20% + \$.50 per successful transaction  
Read more about [ACH](#).

##### BANK WIRE

\$2 per successful wire  
Read more about [bank wires](#).

### Circle's Integration Fees

Furthermore, all collateralized stablecoins can additionally profit from the interest generated from deploying collateral assets on the broader capital market.

Interest rates are approximately 8% even for stablecoins.

## DeFi Rate

	Compound v2	Aave	dYdX Lend	Fulcrum	BlockFi	Nexo	Celsius	Gemini	Bitfinex	Poloniex	Coinbase
DAI	2.92%	1.51%	0%	6.6%	8.5%	8%	4.6%	6.43%	9.13%	-	2%
USDC	2.02%	2.37%	0%	2.66%	7.25%	8%	7.1%	7.99%	-	6.46%	0.15%
ETH	0.06%	0%	0%	1.22%	4%	5%	5.35%	1.26%	6.05%	0.04%	-
BTC	-	-	-	-	4%	5%	5%	1.01%	0.04%	0.4%	-
WBTC	-	0%	-	0.55%	-	-	3.05%	-	-	-	-
USDT	3.22%	4.12%	-	5.11%	9.25%	8%	7.1%	-	-	4.56%	-
MKR	0%	0%	-	-	-	-	-	1.26%	19.21%	-	-
ZRX	0.38%	0.04%	-	-	-	-	1.77%	1.25%	2.54%	-	-
BAT	0.15%	0.11%	-	-	1.5%	-	1%	1.01%	-	-	-
1INCH	-	-	-	-	-	-	5.02%	3.51%	-	-	-
AAVE	3.77%	-	-	-	-	-	4.86%	1.01%	-	-	-
ADA	-	-	-	-	-	-	4.06%	-	0.8%	-	-
ALGO	-	-	-	-	-	-	-	-	-	-	4%
AMPL	-	1.81%	-	-	-	-	-	-	-	-	-
ATOM	-	-	-	-	-	-	-	-	-	0.8%	5%
AVAX	-	-	-	-	-	-	8.3%	-	19.34%	-	-
BAL	-	1.53%	-	-	-	-	-	1.25%	-	-	-

Interest Rates by Token by Platform

## Summary

### Not Just Tokens:

Tether and USDC also deploy their fiat currencies in commercial paper to generate interest for the parent entity.

### High Demand for Capital:

Thanks to the massive adoption of DeFi and its need for deep liquidity and capital pools, interest rates are incredibly high, even for stablecoins. As of writing, the largest stablecoins have interest rates exceeding 8%+.

### Extremely Profitable Spreads:

Most stablecoins don't pay interest on their collateral pools, meaning that their effective cost of borrowing is 0%. This means any capital they deploy is pure profit. Even if deployed at the current risk-free rate of approximately 3.7% for Bitcoin, which is the theoretical floor, Tether is generating a minimum of \$3B USD in profit.

Uncollateralized stablecoins, such as Terra or Waves, generate a profit through “Seigniorage”, the profit made from the delta between the cost to mint a new token and its current value on the market.

### Positive Seigniorage

#### Raw Materials



Cotton and Linen  
(\$0.06 - \$0.14 USD)

#### Currency Notes



US Dollar Bills  
(\$1 - \$100 USD)

### Negative Seigniorage

#### Raw Materials

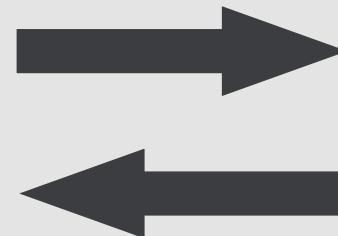
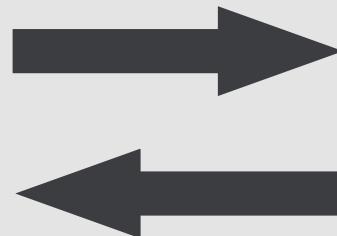


Zinc  
(\$0.021 USD)

#### Coinage



US Penny  
(\$0.01 USD)



US bills are made of 75% Cotton and 25% Linen and cost \$0.06 - \$0.14 cents to produce, meaning printing a \$100 bill generates \$99.86 of profit for the US Mint.

In an opposing example, the metal in a penny cost more than \$0.01 meaning that the US Mint effectively loses \$0.011 USD on each penny they have minted.

Digital Tokens cost nothing to mint meaning 100% of the value of newly minted tokens is pure profit.

 **Terra**  
**Ampleforth**

 **Frax**

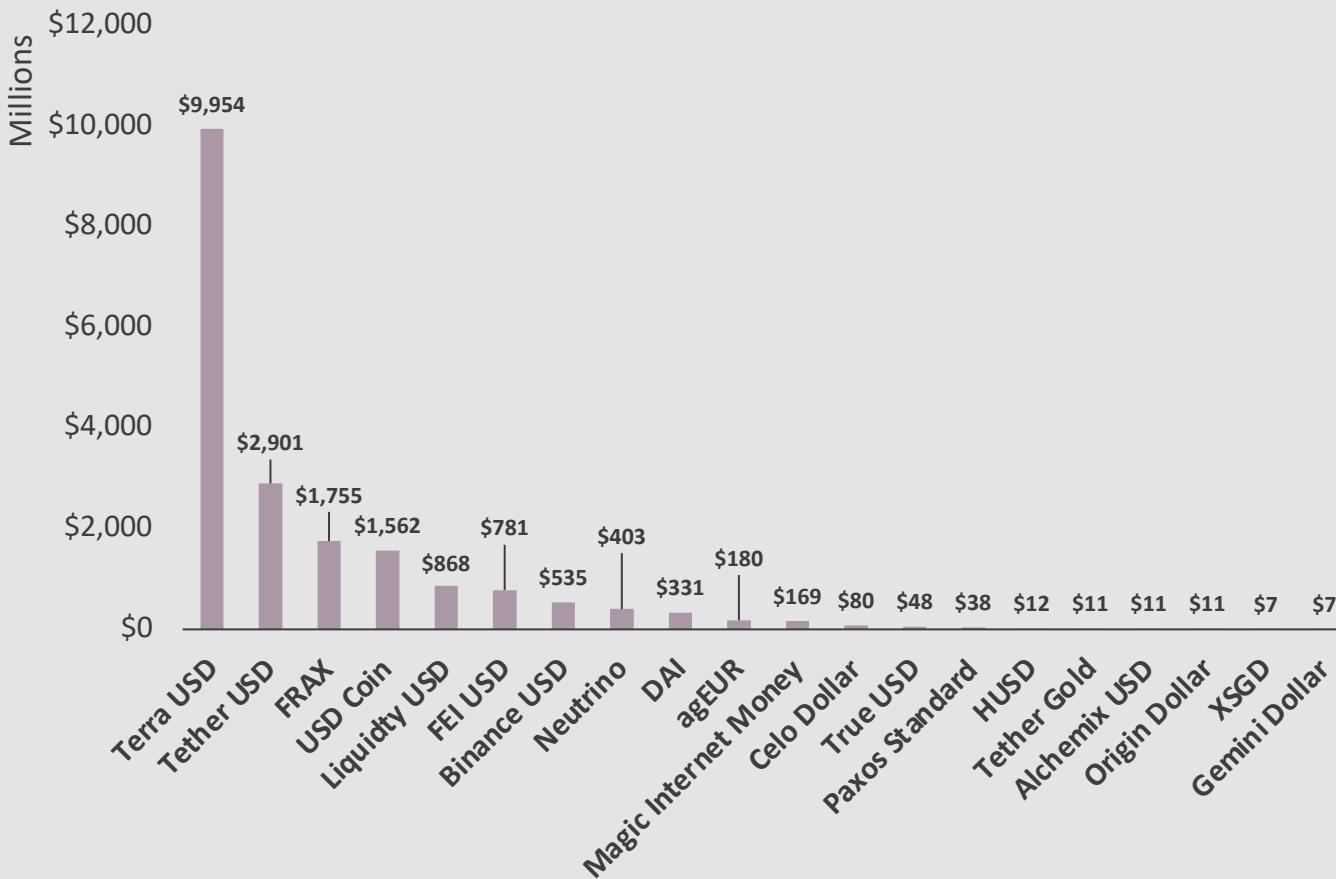
In Terra, Seigniorage profits are given to the users who exchange either their Luna or Terra Tokens to help stabilize the price of Terra.

In Ampleforth, Seigniorage profits are directly fed into the users wallets whenever token supply is increased. However they incur a loss whenever supply is decreased.

In Frax, Seigniorage profits are captured by the issuing team through minting Frax Shares (FXS). These shares along with partial collateral are required to mint FRAX.

These profit drivers have resulted in the top 20 stablecoins alone generating an estimated profit of ~\$19.7B in 2021. 50% of that profit in the past year came from newly minted Terra.

Estimated 2021 Profits by Stablecoin



## Methodology

### Segmentation:

All coins were segmented into either collateral backed coins or uncollateralized algorithmic coins.

### Collateralized Coins:

For collateralized coins, profit was estimated by multiplying their collateral pool at the end of 2022 times the risk free rate of Bitcoin, (3.7% as of writing). It is likely that the effective rate could be higher or lower depending on the % of capital allocated and the specific distribution and return of assets.

### Algorithm Driven Coins:

For algorithmically driven coins, the profit was estimated as the delta in market cap between Jan 1<sup>st</sup> 2021 and Jan 1<sup>st</sup> 2022. This increase in market cap for stablecoins is effectively seigniorage profits.

### Excluded Profits:

We were unable to locate reliable data on ongoing fees for integration projects, exchange spread fees, Tobin Taxes, etc.

Due to this incredible profitability, dozens of stablecoin projects have been deployed over the past few years, with several notable projects reaching over \$1B USD in market cap.



**tether**

Launched in 2014,  
\$78B USD Market Cap



**DAI**

2019  
\$8.9B USD\*

**Ampleforth**

2019  
\$159M USD



**BUSD**

2020  
\$14.5B USD\*



**Terra**

2020  
\$10.1B USD\*



**Frax**

2020  
\$1.8B USD\*



**Magic Internet Money**

2021  
\$4.6B USD\*



**USD Coin**

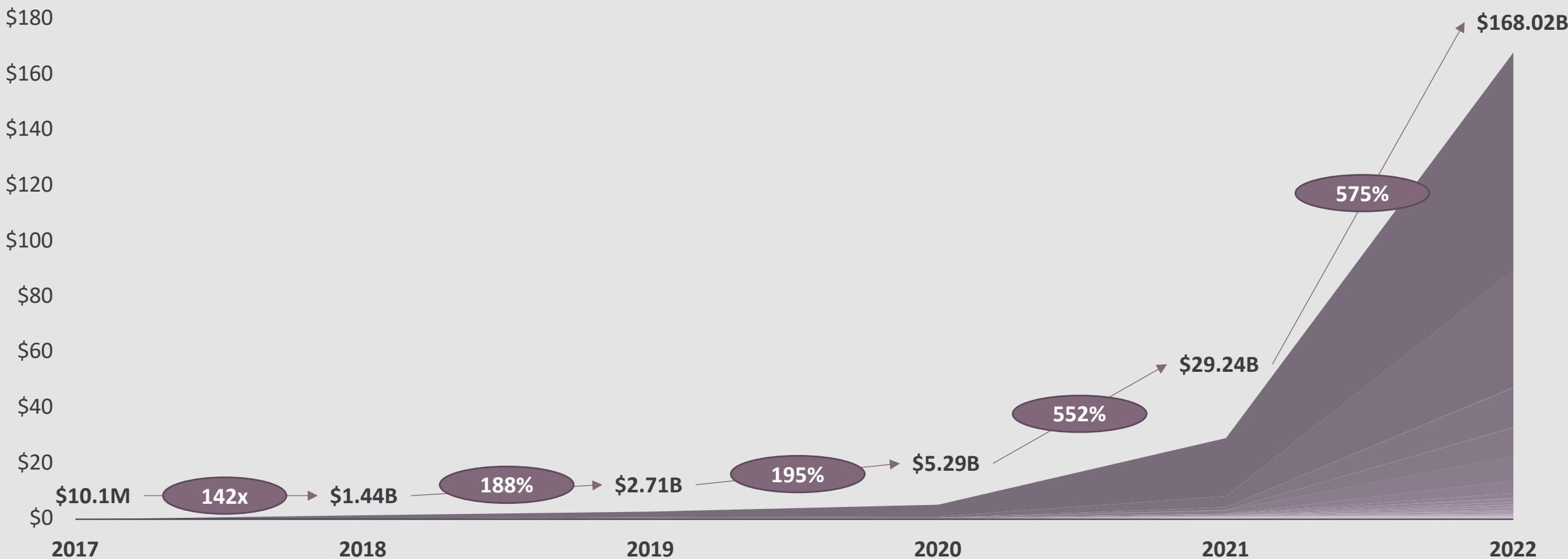
2018  
\$42.2B USD\*

Launch date is the earliest day with non-zero market capitalization

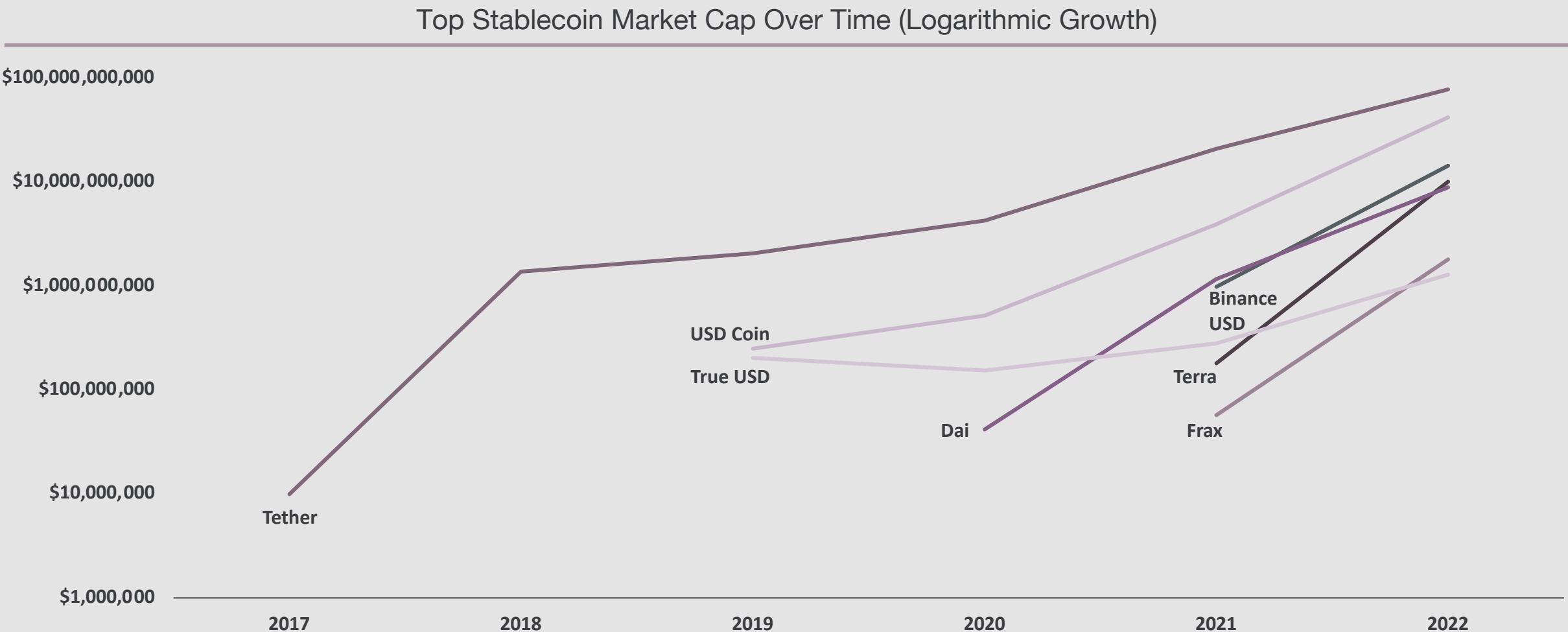
Market Capitalization as of January 1<sup>st</sup> 2022

On January 1<sup>st</sup> 2022, the top 50 stablecoin projects combined had a market cap in excess of \$168B USD. The 5-Year CAGR is 598.1%.

Stablecoins by Market Cap and Type (Measured on January 1<sup>st</sup> 2022)

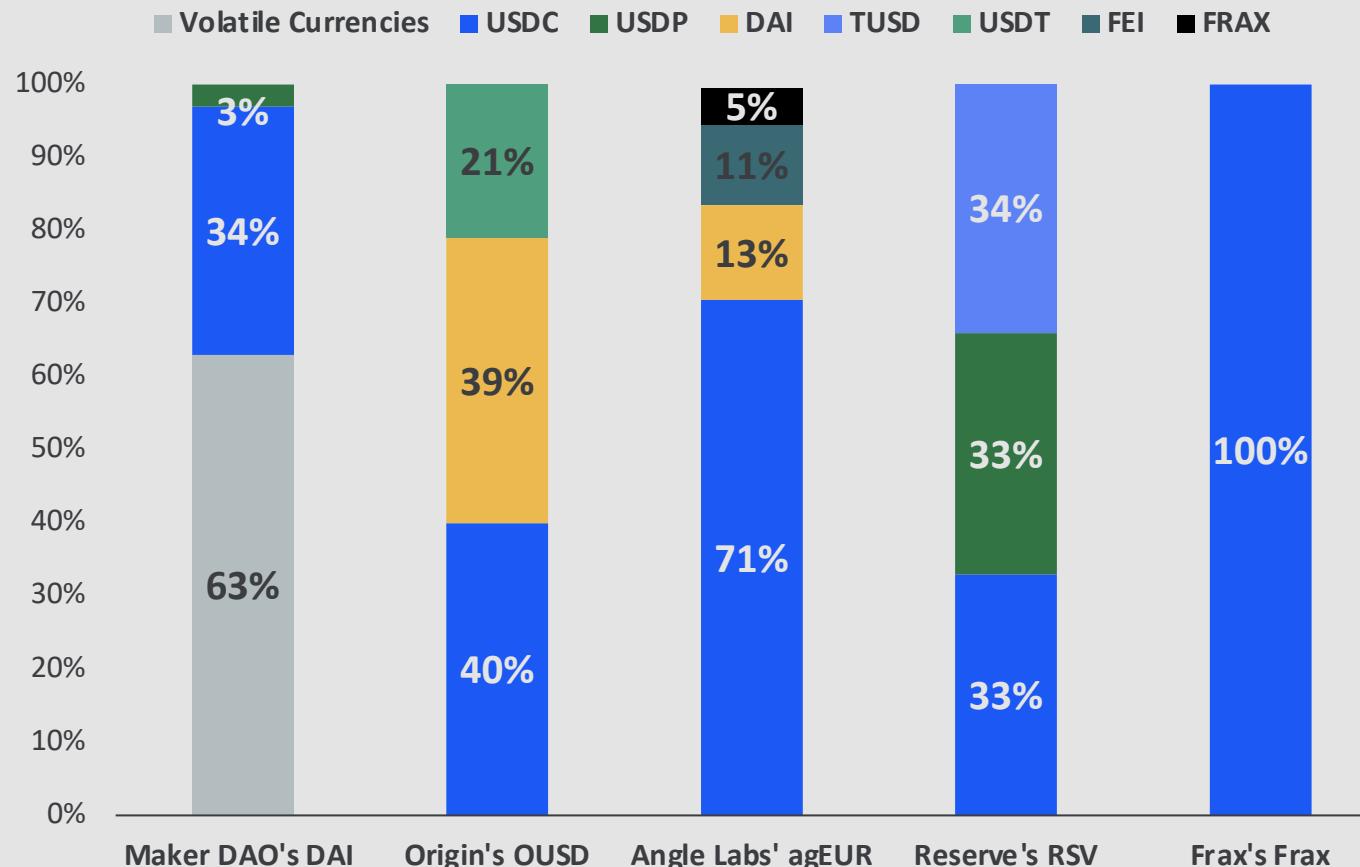


The growth and relative ranking by market capitalization of the largest stablecoins is remarkably stable and consistent given the notorious volatility of cryptocurrencies.



However, a major dynamic of the space is self-reinforcing demand. Most extant decentralized collateralized stablecoins are ultimately backed by custodied stablecoins, enforcing a “pecking order”.

Decentralized Stablecoin Collateral Pool Composition by Asset Type



## Market Dynamics

### Multiplicative Demand:

Every dollar of Origin dollar, Angle Labs agEUR, or RSV ends up being backed by another stablecoin project. Effectively this means that a user who mints \$1 USD of DAI also minted \$0.37 USD of USD Coin. Or in the case of Origin Dollar, printed \$0.62 of USDT and USDC and another \$0.38 of DAI effectively duplicating demand and yielding an artificially high market growth rate.

### Nested Coins Yields Stable Rankings:

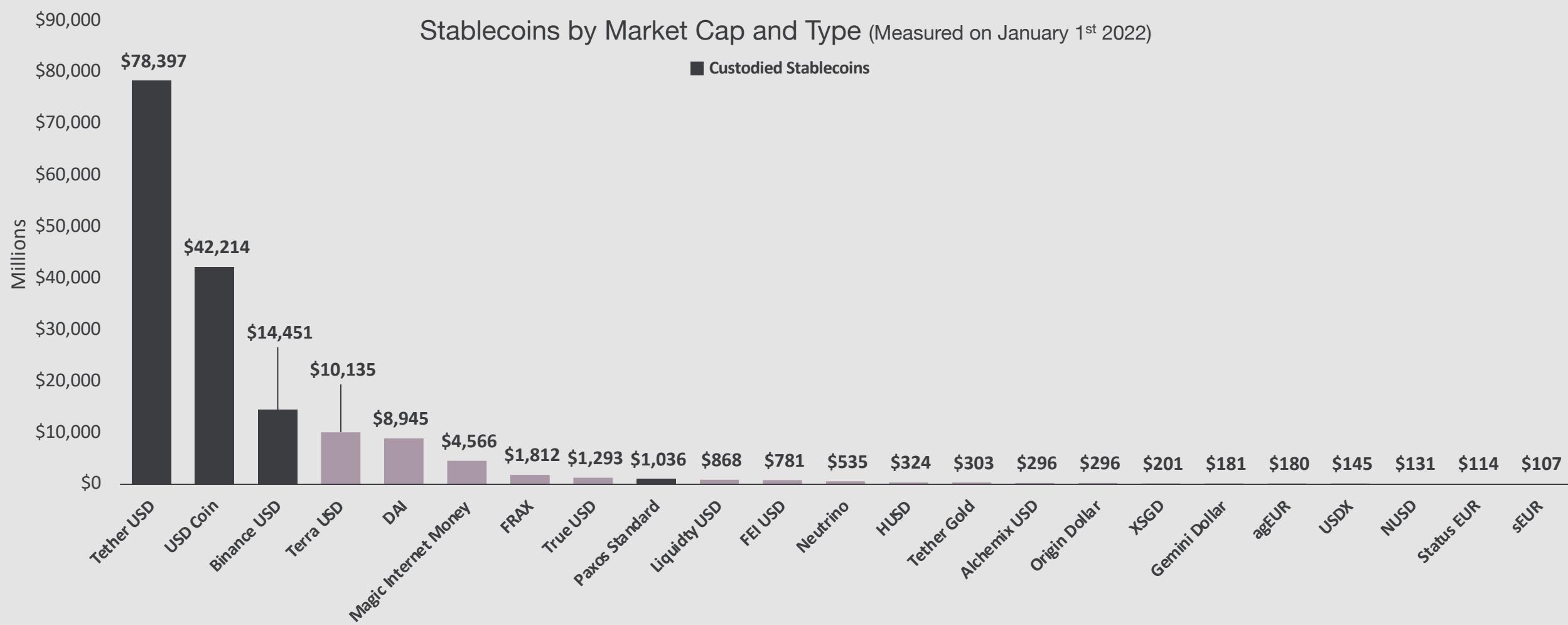
A big reason that these stablecoins remain relatively stable in terms of market cap rankings is that they are largely dependent on each other in a generative way. For every dollar growth of Reserve RSV Dollars, Tether ultimately gains a dollar of growth as well. This ensures that Tether will always be larger than Reserve.

### Significant Cross-Correlation Risks:

This self-fueling growth works in both directions, if a dollar of Reserve RSV is redeemed or taken out of the market, this will cause Reserve to redeem a Tether in effect reducing the size of the Stablecoin market by \$2 or more. This amplified feedback loop that has fueled rapid growth will also fuel a rapid contraction.

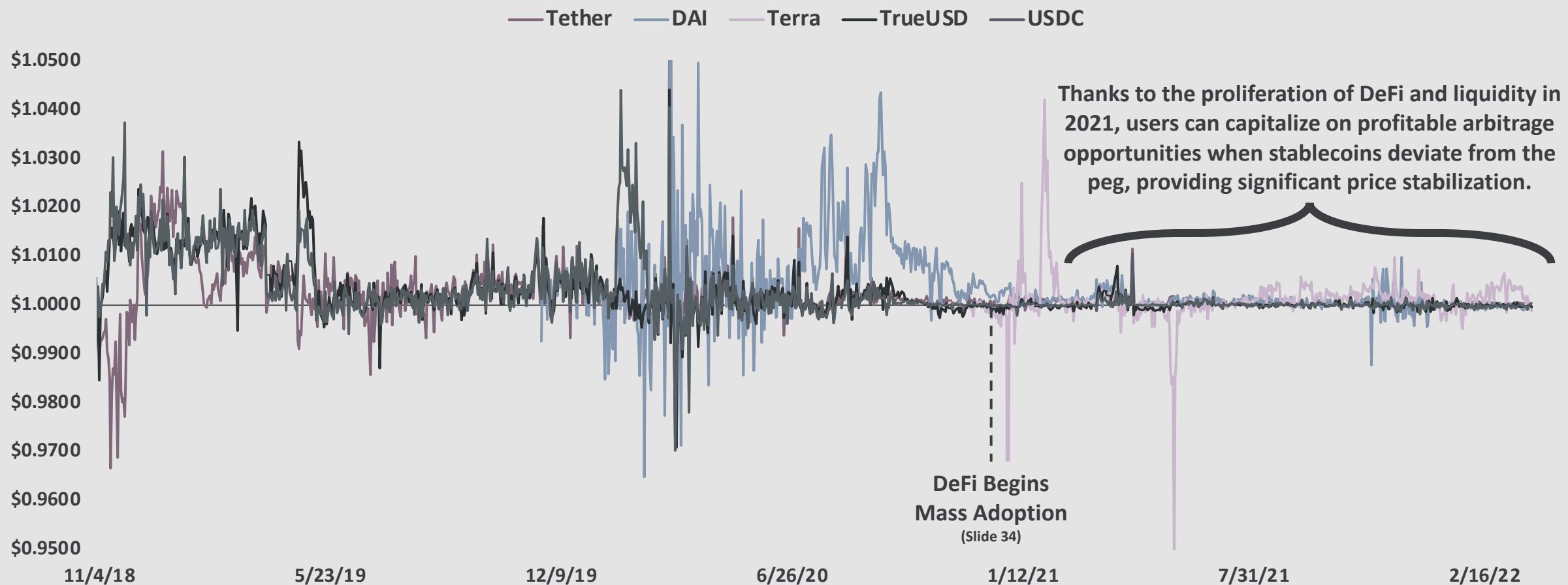
This “pecking order” ultimately funnels most demand to the \$135B USD in market cap of the custodied stablecoins which are ostensibly backed by fiat currency reserves.

Demand ultimately ends up in custodied stablecoins and results in their market caps dwarfing other projects.



Historically, stablecoins experienced large shocks and often fluctuated wildly in price. In a more liquid environment like today, market forces and arbitrage maintain a much tighter spread.

Stablecoins have historically been very volatile, but have recently stabilized thanks to highly liquid DeFi applications.



In general, Custodied coins are the most stable provided the issuer is honest, followed by Over-Collateralized coins, then Partially Collateralized Hybrids, and finally by Pure Algorithmic tokens.

Least Stable

Most Stable

Algorithmic

Collateralized

Custodied



**Frax**

Frax is algorithmic but also has partial collateral backing

**Ampleforth**

With Ampleforth, users are still holding 100% of the value risk, the token itself simply changes in volume to always equal \$1 USD



**Terra**

Terra is a multi-coin algorithmic model that has an intrinsic use case for its native token and also has sizable (\$10B) reserves of BTC

**Reserve**

Reserve is collateralized with only custodied stablecoins.



**USDC**

USDC appears today to be the most stable as it is the most transparent custodied stablecoin. While they continue to refuse auditing, there are monthly attestations as to the backing reserves. Though, like Tether, there are many outstanding questions.

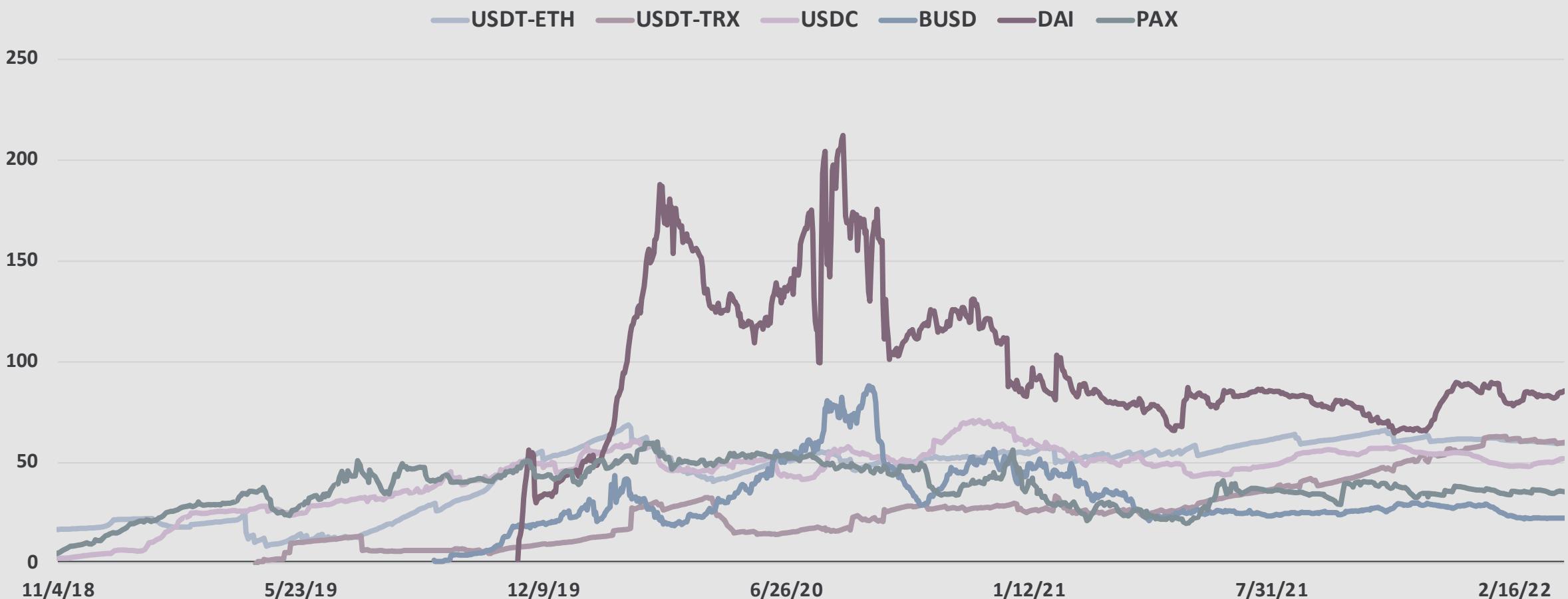


**tether**

Tether is backed by fiat dollars in the bank which should be the safest investment, however Tether has sizable holdings of commercial paper making its portfolio riskier than USDC. In addition, they have been more opaque with their legal structure and holdings than USDC.

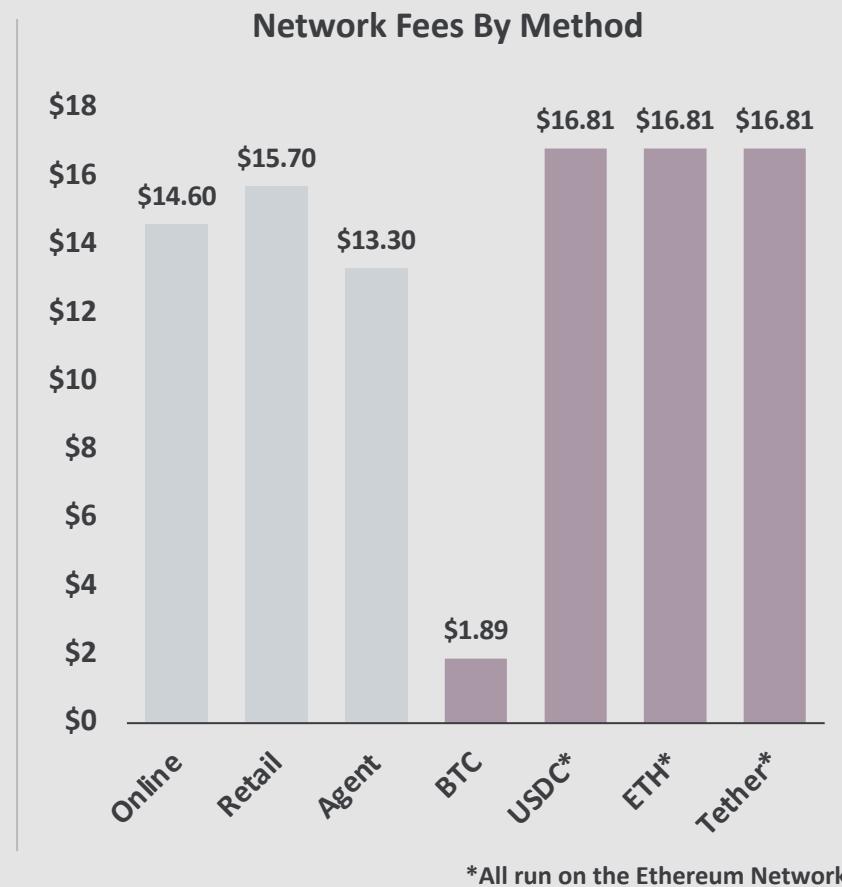
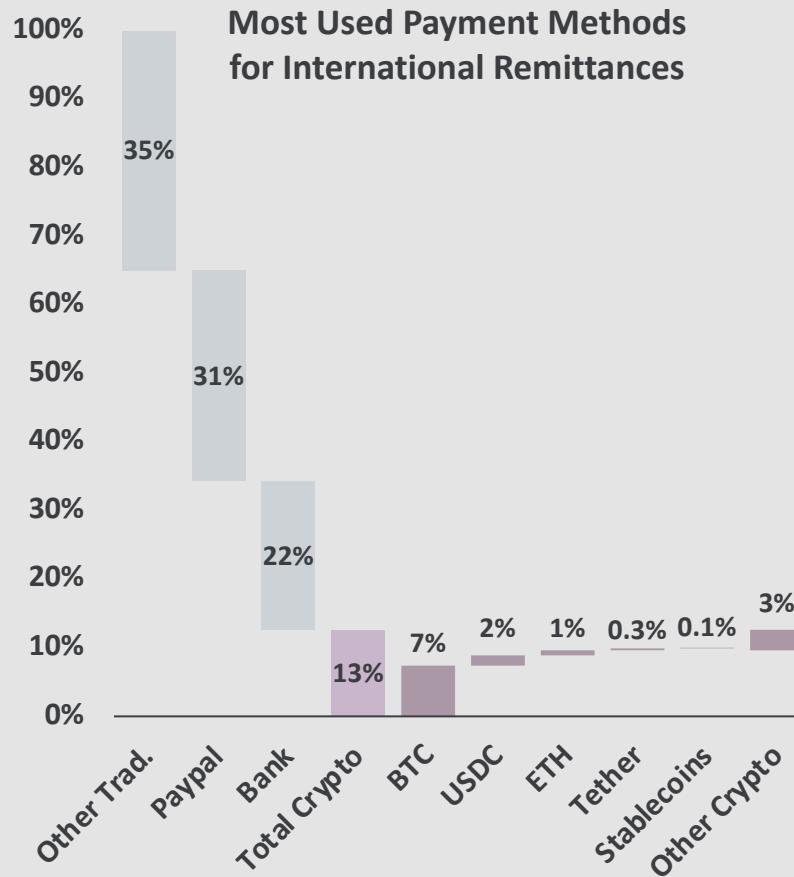
Stablecoin demand is strong today, and most stablecoins see high annual velocity. While the US dollar\* changes hands 1.2 times a year, most stablecoins change hands 50+ times in 1 year.

Velocities for stablecoins are high, particularly decentralized tokens like DAI which are used primarily for DeFi applications.



# The original use case for stablecoins, transactions and remittances, is economically uncompetitive today due to the high gas and execution fees relative to Bitcoin.

Network fees limit the practical applications of stablecoins for transactions and remittances.



**Increasing User Adoption:**  
22.5% of people who have sent remittances in 2021 used crypto to do so at least once. However of those users 12.6% now use it as their primary method.

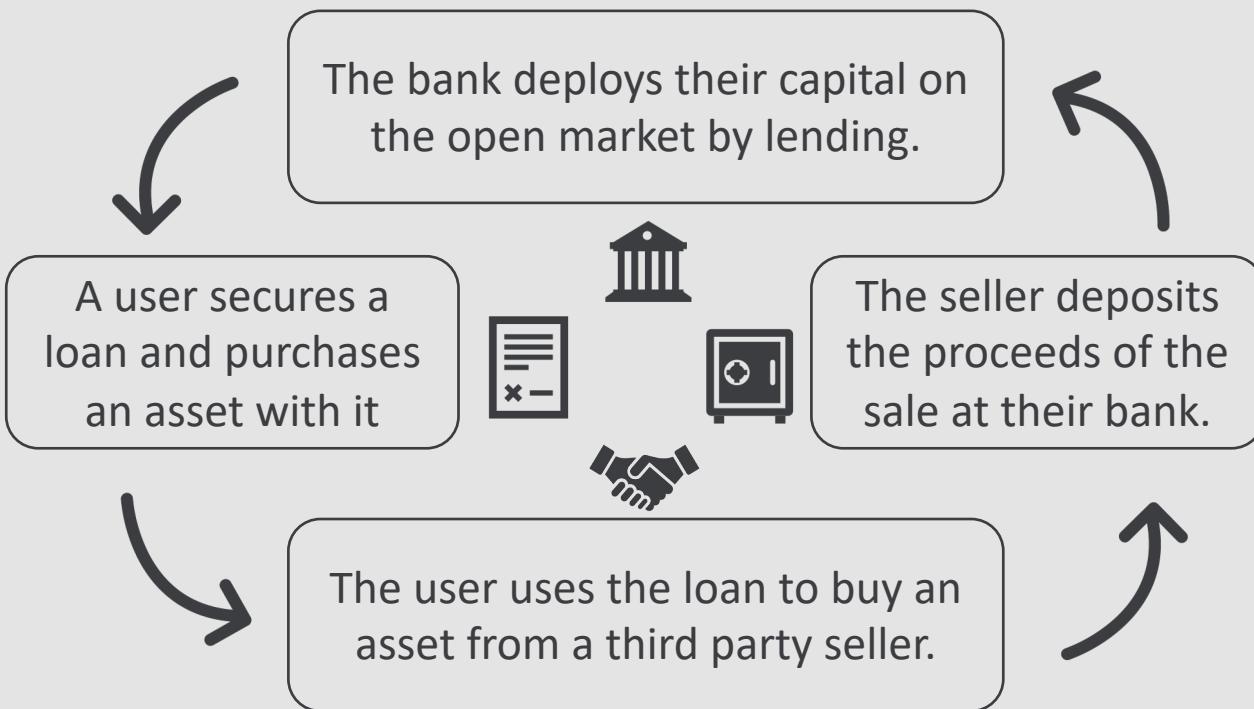
**Preference For Bitcoin:**  
Due to the high costs of the Ethereum Network, most users prefer Bitcoin compared to either ETH, the native token of the Ethereum network, or the multitude of ERC-20 stablecoins on the network that incur a similar fee for transfers.

**Price Sensitive Consumers:**  
As the average transaction amount is roughly \$250, fixed transaction fees comprise a large component of the overall value transferred and are more important than stabilizing the price volatility of BTC.

**Lack of Government Regulation is a Plus:**  
As many remittance users may not have access to traditional banking infrastructure or are sending money to countries with endemic corruption, the lack of regulatory oversight is seen as an advantage not as a liability as it would be with traditional transactions.

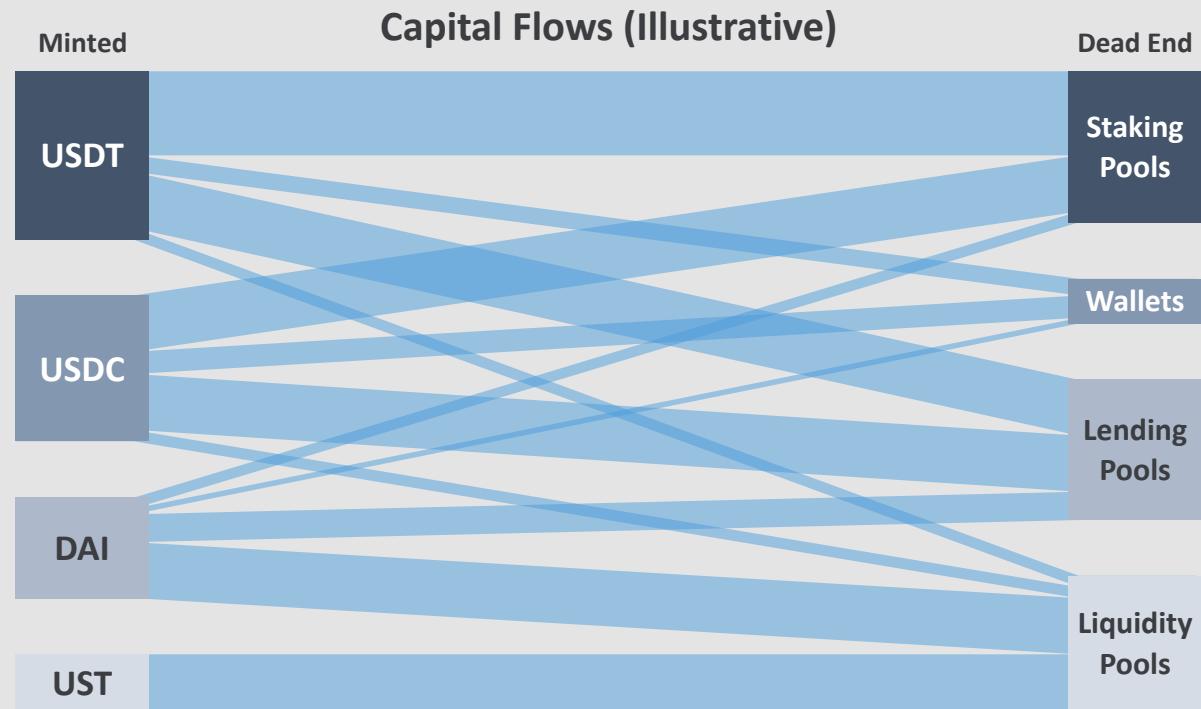
At a very high level, the single largest use case for stablecoins is serving as collateral. Staking, lending, and liquidity pools all have massive capital needs, however that collateral can't be redeployed.

In traditional finance, most capital is constantly redeployed.



This is possible due to the highly sophisticated underwriting possible in traditional financial system. As all parties identities are known and verified, it is possible to make loans without the need for significant amounts of dead collateral in order to secure or issue loans. In addition, banks loan each other either reserves (repo) or securities (reverse-repo) to cover each other's imbalances continuing to spin the flywheel.

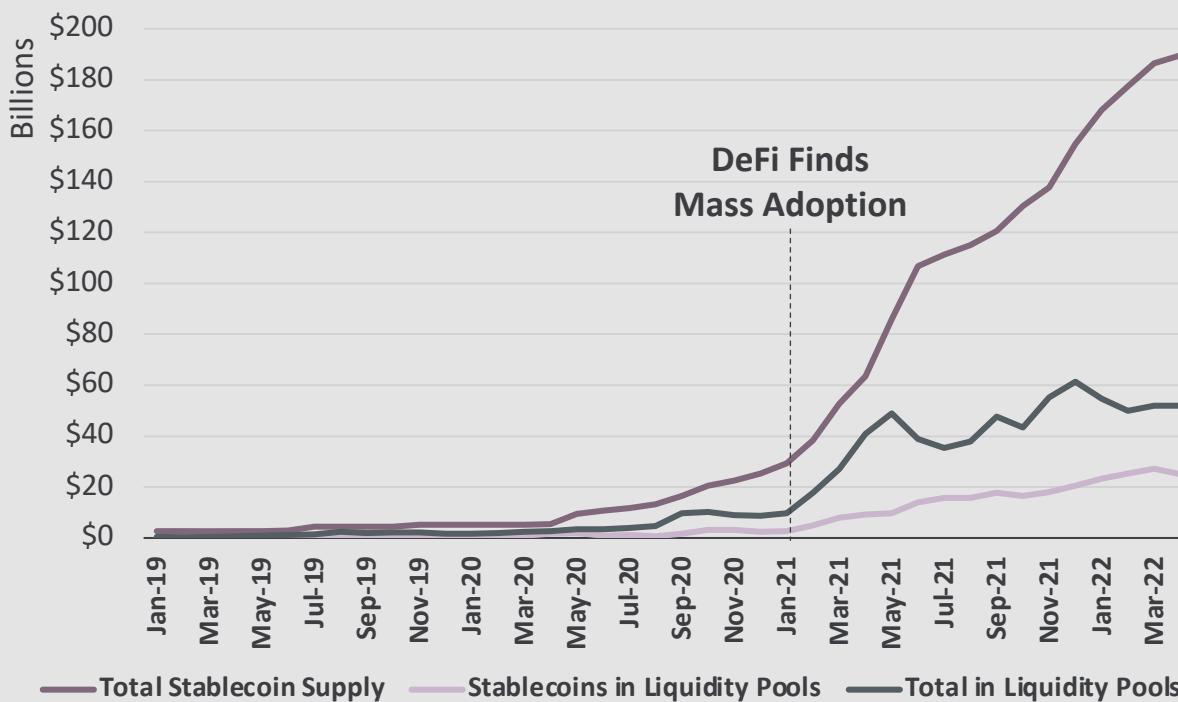
In DeFi, most capital hits a dead end.



In cryptographic networks, identities are unknown so the primary way to establish trust in DeFi is to post significant amounts of collateral, often overcollateralizing. As the collateral forms the basis for trust, it is encumbered and cannot be redeployed by either party. In effect, this capital has reached a dead end and must simply wait until either the agreement has resolved, the collateral is liquidated, or a party exits the agreement.

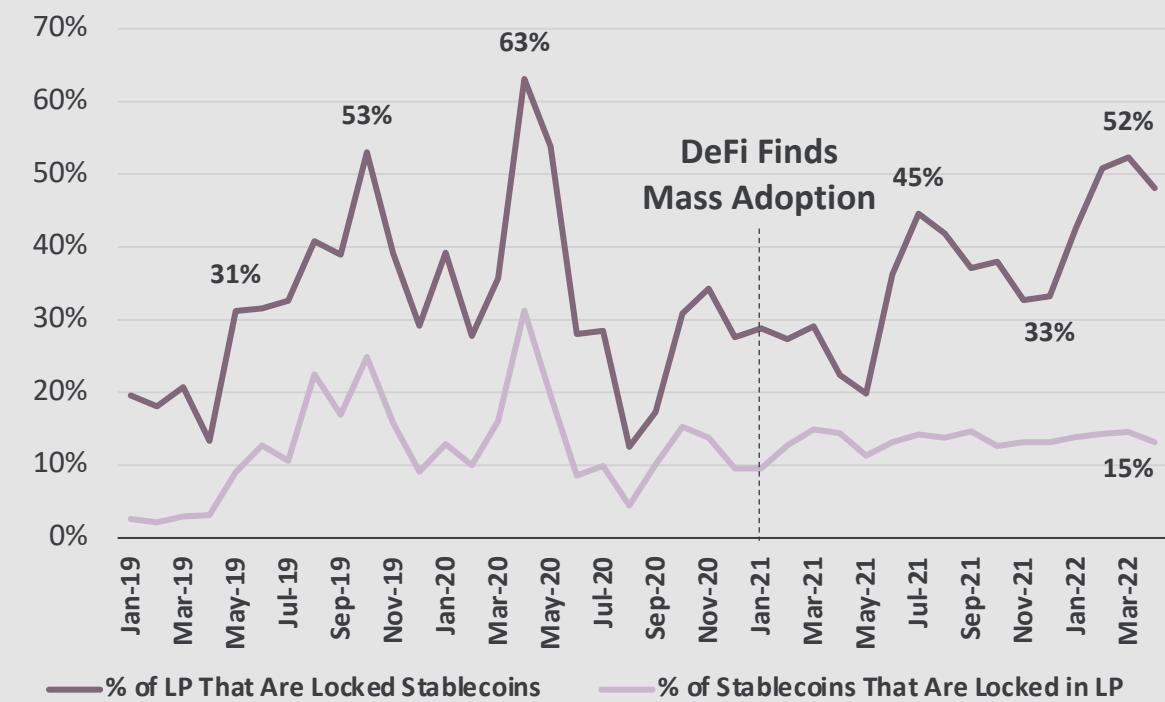
# Stablecoins power decentralized finance and are a key component of nearly every modern DeFi application from DEXs to lending pools.

Stablecoin supply exploded with the advent of DeFi, here we proxy that DeFi demand with liquidity pools.



Here we've plotted total stablecoin supply vs liquidity pools. Liquidity pools are used in automated market makers in DEXs and are a good proxy for the initial generation of DeFi applications and their capital and collateral requirements. You can see that the rapid growth of DeFi in early 2021 kickstarted the massive boom in stablecoin growth.

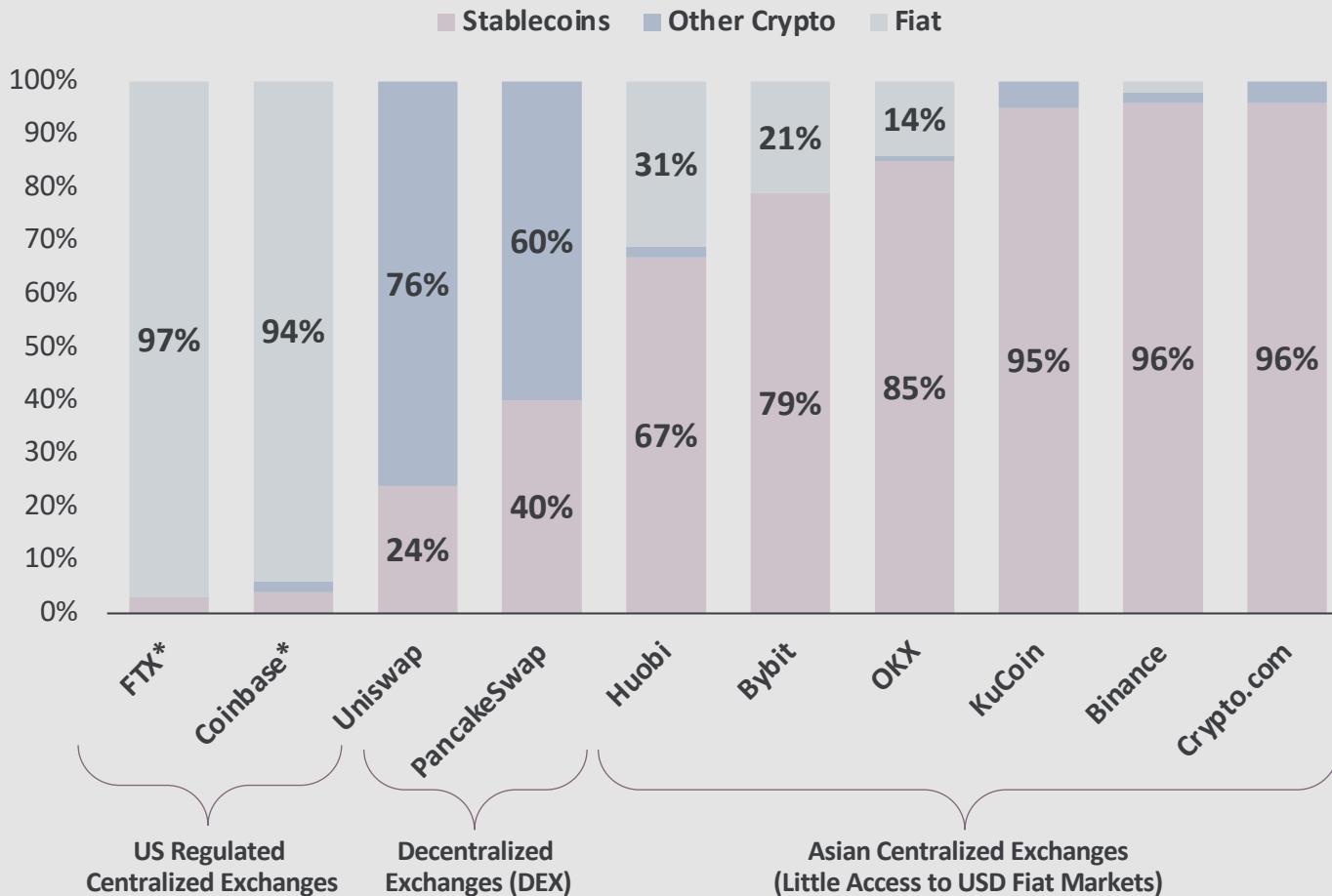
Stablecoins have been an integral and vital part of DeFi since the beginning.



A consistent 15% of all stablecoins are locked in DEX liquidity pools. In addition, this trend seems to be accelerating as DeFi is increasingly reliant on stablecoins. Today approximately 50% of all liquidity pools assets are stablecoins, a proportion that has been consistently growing since the DeFi Boom in early 2021.

Stablecoin pairs comprise the majority of exchange volume and dominate trading. Especially as China-based exchanges, the biggest in the world, lack access to any fiat facilities in any currency.

Quote Dominance by Currency by Exchange



Market Dynamics

#### Stablecoins Dominate Exchanges:

Outside of US based, regulated exchanges like FTX or Coinbase, most exchange volume is quoted and transacted in stablecoins. This means that one side of the exchange is usually a stablecoin, i.e. selling BTC for USDT or using USDC to buy ETH.

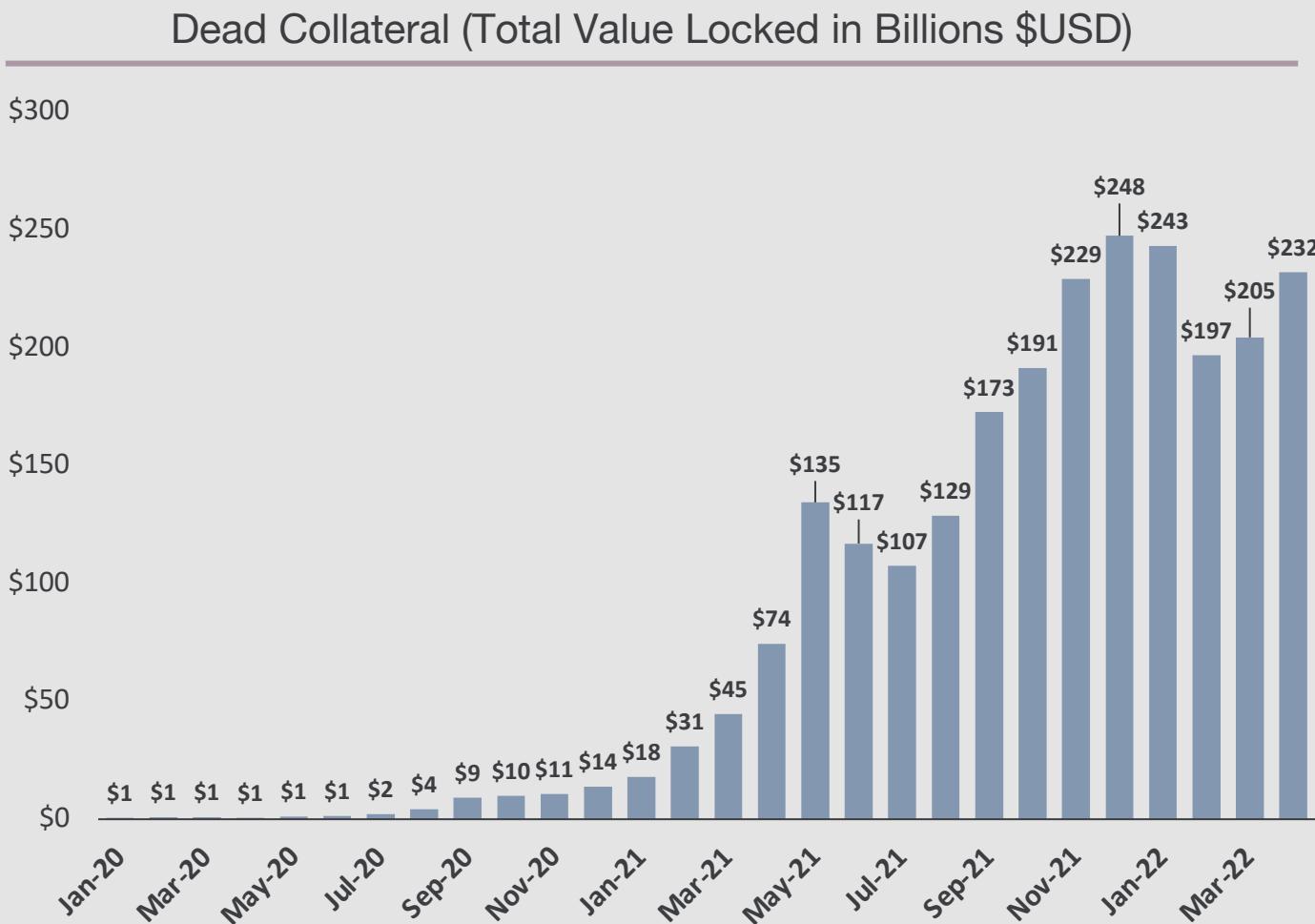
#### Far More Common on Asian Exchanges:

Asian exchanges in particular are dominated by stablecoins with almost 90% of quotes on Binance using Tether as one side of the trading pair. Binance itself is the largest exchange and 6x larger than its nearest competitor, Coinbase in 2<sup>nd</sup> place, meaning that the overall DeFi market relies on stablecoins for key trading pairs, specifically Tether. This is likely due to the strict currency controls of both the US and Chinese Government which limit access to currency for Chinese citizens and companies.

#### Most Crypto to Crypto Trading Occurs on DEXs:

From the data, very little crypto to crypto trading actually takes place on any centralized exchange. The majority of trades that use crypto as both pairs, i.e. DOT to BTC or ADA to ETH, take place on decentralized exchanges.

Since Q3 2021, more than \$200B USD of capital has been locked up in these contracts and constructs. A significant portion of this collateral (~\$72B) is comprised of stablecoins.



## Summary

### **DeFi is Heavily Dependent on Stablecoin Collateral:**

As modern crypto lacks the complex underwriting and credit models of traditional finance, the only way to establish credit worthiness or identity is to promise collateral and place it in a smart contract that retains control of the funds.

### **This Collateral is Mostly Dead & Cannot Be Deployed:**

As the collateral is the basis of trust in the decentralized application, its stability and security is of paramount importance. This is one of the reasons that stablecoins are a preferred collateral currency as their stable value eliminates some of the risk of being liquidated. This also means that the capital must remain in the smart contract and can't be loaned out without introducing additional risk to the original transaction.

### **“Rehypothecation” in DeFi:**

A regulated and mostly banned practice in traditional finance is “**rehypothecation**” or redeploying collateral. It was an accelerant in the 2008 financial crisis and has since been banned in traditional markets. Celsius was aggressively rehypothecating to increase capital efficiency and generate higher returns on its liquidity pools. However the significantly higher risk of this strategy ultimately led to its forced closure (*Slide 43*). It remains to be seen if there is an efficient de-risked solution in DeFi.

It is currently unknown if this demand for collateral will persist. Modern financial institutions have built sophisticated credit models that allow them to extend unsecured lines of credit.

## Many Companies Are Attempting to Create Credit Models for Crypto

The screenshot shows the LedgerScore website. At the top, there's a navigation bar with the logo, "LedgerScore™", "LedgerScore Token", "How It Works", "Personal", "Business", "About", "SIGN IN", and "SIGN UP". Below the navigation is a purple header with the "MEET LEDGERSCORE" section. This section includes a profile picture of Michael Brent, his email (michael.brent@gmail.com), and a "LOGOUT" button. To the left is a "Quick Access" sidebar with links like "Dashboard", "Exchange", "Portfolio", "Credit Report", "Transactions", "Buy & Sell Coins", "Deposit/Withdraw", "Send/Receive", "Rewards", "Utility Plan", "Account", "Notifications", "Settings", and "FAQ". The main content area features a "Welcome to Dashboard" section with charts for BTC (\$10,708.70), ETH (\$349.58), XEM (\$0.1198), XRP (\$0.291), and Market Cap (198.21B). It also shows a "Crypto Newsfeed" with a headline about Ripple's cyber security risks. On the right, there's a "Credit 2.0 for Cryptocurrency" section with the subtext "Independent Financial Reporting for DeFi and Traditional Lending". At the bottom, there's a "Your email address" input field and a "SIGN UP" button. The footer includes logos for CoinMarketCap and CoinGecko.

## Market Impacts of a Successful Model

### Drastically Reduced Stablecoin Demand:

Today the primary way to establish trust is through stablecoin collateral. If a reliable method is developed to establish identity and solvency of an entity without holding a large pool of assets in a pool, it would drastically reduce the need to keep \$200B+ USD in locked pools.

### Strongest Impact on Lending Pools:

The highest impact would be felt in lending pools as many would pivot to a function similar to modern day commercial credit card companies where they extend anywhere from \$10,000 – \$100,000+ lines of credit on an entirely unsecured basis based on third party credit scores sourced from oracles.

# Stablecoins as a class have incredible utility and serve a myriad of use cases that span a wide breadth of traditional finance structures.

Here we've compared them to their closest traditional finance analogue and described that analogue's challenges.



## tether

### Demand Deposit Bank

In addition to the default risk that comes with loaning out any amount of capital, there is a liquidity risk as loans are typically long-term, sometimes years like a mortgage, whereas deposit demand is short-term and volatile.

### Real World Failures

In the early 1900s, there were several bank runs that led to the fall of multiple financial institutions. These failures cascaded to create the great depression, and led to the creation of the FDIC and Federal Reserve.

### Real World Solutions

All depository institutions are backed by a government agency such as the FDIC which guarantees funds in the event of a default. To prevent liquidity risk in the event of high withdrawal demand, banks work together through the Fed Funds or LIBOR to cover each other's liquidity needs on demand.



### Asset Backed Securities (ABS)

ABS introduce large cross-correlations that are difficult to manage and untangle. This amplifies the effects when one of the underlying assets experiences a shock as portfolios are far less diversified than they appear.

In 2008, Real Estate prices began to soften and fall, causing a death spiral in the overall financial markets as mortgaged back securities had cross-correlation, that went unnoticed, across nearly the entire market.

As ABS are relatively new inventions, and the first crisis was felt in 2008, no time-proven solution exists. Since the 2008 crash, the primary prevention mechanisms in place is reducing contagion by limiting who can hold exposure to these assets and reducing the cross-correlation exposure for depository institutions.



## Terra

### Central Bank or Federal Reserve

Market shocks or monetary mis-management can quickly erode a country's currency. While this is slowed in the real-world by providing an advantage in terms of export costs, this balancing effect does not exist for stablecoins.

In Weimar Germany, monetary mismanagement led to the complete collapse of the German Papiermark in 1923. In modern times, Venezuela's currency has completely collapsed and been supplanted by the USD.

Most central banks have an in-depth understanding of monetary policy and its effects and spend billions to generate accurate forecasts of demand. As a further backstop in case of inaccurate forecasts, they maintain foreign currency reserve, or baskets of foreign currency that can be used to manage money supply.

Stablecoins share some of these challenges and also have many that are unique to them. The first one we will address is poor capital efficiency for collateralized stablecoins.



## Poor Capital Efficiency

**Collateralized Stablecoins historically have been very capital inefficient. Overcollateralizing ultimately encumbers more liquidity than it creates decreasing the overall capital available in financial crypto markets.**

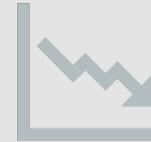
**Algorithmic stablecoin projects offer a time-proven solution that has worked in the traditional financial world, and is purely capital and liquidity additive. However this comes with the challenge of runs and hyperinflation as the assets are not backed by collateral.**



## High Cross-Correlations

Many stablecoin projects like DAI are directly dependent on other stablecoin projects for their stability. This creates cross links that could cause amplify shocks across the entire ecosystem similar to the 2008 Financial crisis.

Both fiat-backed stablecoin projects and purely algorithmic stablecoin projects offer some degree of diversification, however the situation is more complex with some algorithmic stablecoins, such as Terra which is partially collateralizing with BTC.



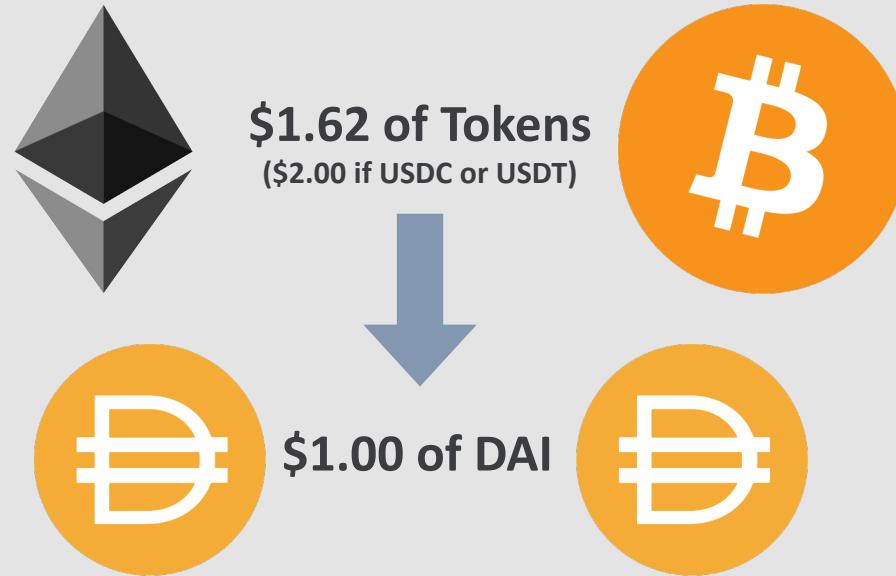
## Algorithmic Supply Reduction

Most multi-coin algorithmic stablecoin projects struggle to reduce token supply, especially at the speed at which demand curves can change. Rebasing models can, but it comes at the cost of sacrificing a wallet's stable value.

Both fiat-backed stablecoin projects and over-collateralized stablecoin projects simply respond to demand and automatically liquidate supply when it is unneeded through token redemptions for either the posted collateral or the custodied assets.

One of the primary limitations of collateralized stablecoins is that it is very capital inefficient, and in cases of overcollateralization, locks up more liquidity than it creates.

As an example, capital inefficiency in DAI costs users \$214.3M\* per year at just the risk-free rate excluding the fiat currency.



Stablecoins like DAI are very capital inefficient. What was once \$1.62 USD of free assets becomes encumbered and dead collateral to generate only \$1 USD of DAI. If using USDC or USDT, not only are the tokens encumbered, but so are the underlying fiat dollars. Today there is a total of \$9,420,595,252 USD in DAI issued, but that requires locking up \$15,213,261,159 USD of otherwise useful on-chain liquidity, and \$4,716,110,959 of fiat currency.



The **New York Federal Reserve** published a research paper on February 7<sup>th</sup>, 2022 on the challenges of liquidity lockup in stablecoins, the relevant portion of the article is cited below.

### ***Stablecoins tie up liquidity unnecessarily***

*Some policy makers now seem to be converging toward the idea that only a digital coin that is 100 percent backed by perfectly safe and liquid assets is viable. However, such a design may be a double-edged sword. On the one hand, it should help limit credit and liquidity risk to stablecoin holders, so long as there is legal and operational certainty that the liquid assets will remain available to meet the claims of these holders. On the other hand, tying up safe and liquid assets in a stablecoin arrangement means they are not available for other uses, such as helping banks satisfy their regulatory requirements to maintain sufficient liquidity, for example. This could lead to disruptive shortages of safe and liquid assets.*

**Full Source:** <https://libertystreeteconomics.newyorkfed.org/2022/02/the-future-of-payments-is-not-stablecoins/>

\*Based on the Bitcoin options risk-free rate of 3.7% and the \$5.8B USD of overcollateralized funds.

Deploying collateral, a process called “rehypothecation” is very risky and was an accelerant in the 2008 global financial crisis. In traditional markets, it is heavily regulated and strictly controlled.

Before the 2008 financial crisis, collateral was regularly redeployed which led in part to the severity of the crash.

### Example of Rehypothecation



(1) A large shareholder wishes to access some of their equity, but doesn't wish to sell their shares. They approach a bank and secure a cheap loan using their shares as collateral. The bank loans the shareholder some money and holds the shares as collateral.

(2) The bank then takes that collateral that they don't have legal ownership of (but they are in custody of) and loans it out to a short seller to utilize in their trading strategy. The short seller performs their trade, purchases the shares and returns them at a later date

(3) In an ideal scenario, the bank has 2x the effective interest on its loan.

Here, in rehypothecation, an asset such as stock shares, or in our case custodied tokens, are used as collateral to secure a loan. However, the entity that issued the loan takes the collateral and loans it out to generate additional interest. As long as that second loan (2) does not default and returns the assets in time, the system works. However if loan (2) defaults, the bank is now on the hook to provide the original capital which may have significantly appreciated in value. Unfortunately, we saw this in practice in 2008 with real estate assets. Many banks were performing a sophisticated rehypothecation process using mortgage backed securities, and when the real estate prices collapsed, it amplified a negative feedback loop which helped accelerate the 2008 financial crisis. Due to the risks, this practice is carefully regulated.

# Celsius attempted to build a stablecoin that redeployed collateral, however it was quickly called out as far too risky and was ordered to suspend operations by the state of New Jersey.

Rehypothecation is incredibly risky and in 2021, Prime Trust cut ties with Celsius over its alleged use.



*"I can tell you unequivocally that the article that Coindesk published is completely false. Remember, Coindesk is owned by the same company that owns one of our largest competitors,"*

- Alex Mashinsky CEO of Celsius

The CEO of Celsius was quick to deny these allegations and strongly refuted them as "completely false". However, publicly available information illustrated that their business model seemed to be based on using collateral as a liquidity source for the next loan in a very complex multilayer rehypothecation scheme.

Source: <https://www.coindesk.com/business/2021/06/24/custodian-prime-trust-cuts-ties-with-crypto-lender-celsius/>

<https://blog.celsius.network/what-we-do-how-we-do-it-9a82124f7159>

Losing their prime broker was just the beginning of the fallout of rehypothecation for Celsius.



*Pursuant to the authority granted to Christopher W. Gerold, Chief of the New Jersey Bureau of Securities, under the Uniform Securities Law (1997), N.J.S.A 49:3-47 to -89 ("Securities Law") and certain regulations thereunder, and based upon documents and information obtained during the investigation by the New Jersey Bureau of Securities ("Bureau"), the Bureau Chief hereby finds that there is good cause and it is in the public interest to enter this Summary Cease and Desist Order ("Order") against Celsius Network, LLC.*

Celsius was investigated by NY, NJ, TX, and KY who found these allegations to be true. Due to the large risks of rehypothecation and their business model, Celsius was issued a cease and desist order by the state of New Jersey, ordering it to suspend all business practices on September 17, 2021. They now operate internationally and for U.S. qualified accredited investors.

Source NJ: <https://www.nj.gov/oag/newsreleases21/Celsius-Order-9.17.21.pdf>

Source KY: <https://kfi.ky.gov/Documents/Celsius%20Network%20LLC%202021AH00024.pdf>

One of the largest reasons consumers utilized custodied services like Tether or USDC is that they ostensibly did not deploy their custodied fiat deposits onto the capital markets.

Unfortunately, Tether appears to have always deployed their capital and has been quickly backtracking on that promise.

## 2016



### 100% Backed

Every tether is always backed 1-to-1, by traditional currency held in our reserves. So 1 USD $\ddagger$  is always equivalent to 1 USD.

The original promise of Tether from their archived website in 2016 was a digital token backed 1 to 1 with fiat currency. It is unknown currently if this was ever the case, but according to legal disclosures, the currency provided as collateral has been confirmed to have been deployed in capital markets as early as mid-2017.

## 2019



### 100% Backed

Every tether is always 100% backed by our reserves, which include traditional currency and cash equivalents and, from time to time, may include other assets and receivables from loans made by Tether to third parties, which may include affiliated entities (collectively, "reserves"). Every tether is also 1-to-1 pegged to the dollar, so 1 USD $\ddagger$  is always valued by Tether at 1 USD.

During the legal proceedings In 2019, the website was quietly changed to include other assets "from time to time".

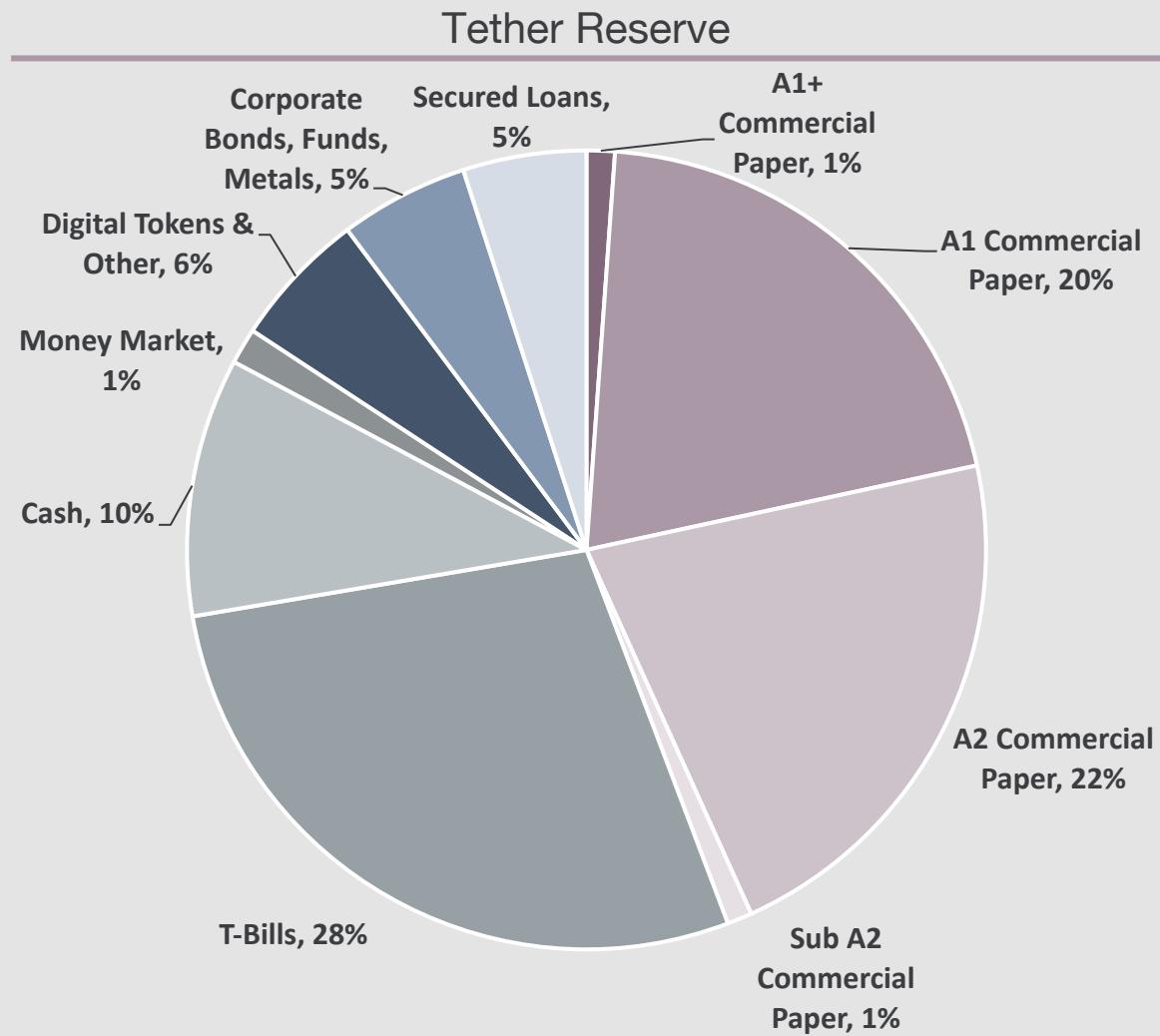
## 2022

# Transparency

All Tether tokens are pegged at 1-to-1 with a matching fiat currency and are backed 100% by Tether's reserves. The value of our reserves is published daily and updated at least once per day.

After Tether had been successfully sued by the Attorney General of New York in 2021, Tether's website was further changed and they have admitted that their reserves are not cash. Their reserves are broken down in detail on the next slide.

That unfortunately is not the case and a plurality of Tether's reserves are deployed in short-term commercial paper. Current speculation is that it is primarily deployed to Chinese real estate developers.



### Commercial Paper Specifics

*If the concern is Evergrande, see our earlier statement: "Doesn't hold and never held." (In regards to Evergrande commercial paper specifically)*



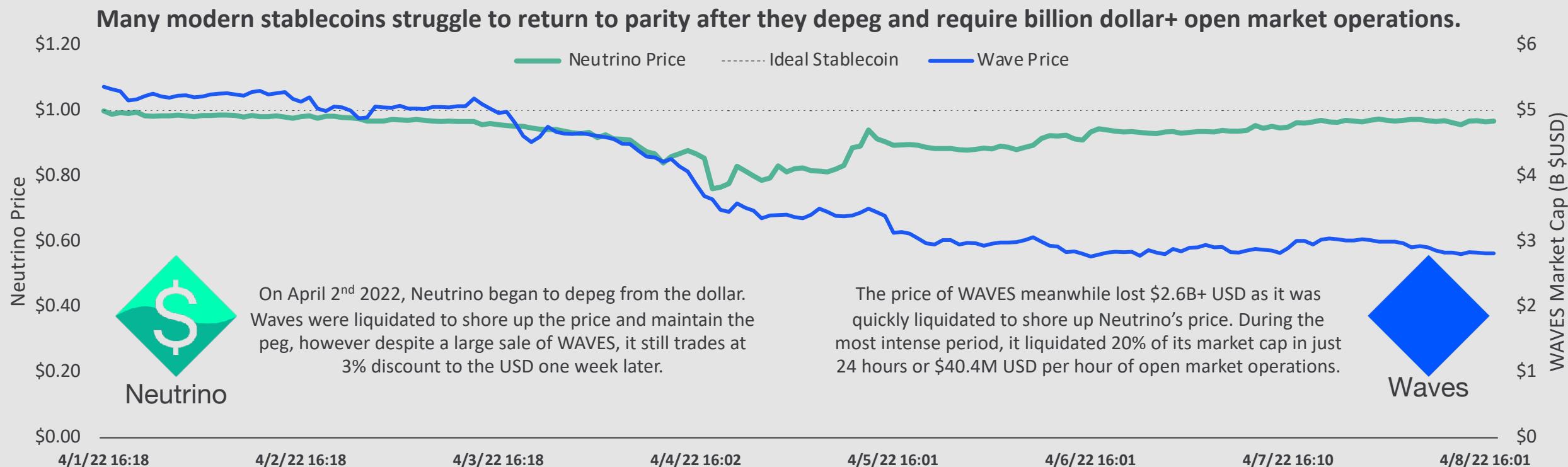
*If the concern is Chinese CP, as such, we have published the ratings on our portfolio and the maturities as part of our June 30, 2021 reserves report (subject to the assurance opinion from Moore Cayman).*

*-Stuart Hoegner (General Counsel of Tether.to)*

While Tether has claimed to have never held Evergrande stock specifically, it's implied they hold Chinese commercial paper with A2+ ratings. It should be noted however that these companies have seen significant downgrades in the past 3 months and as of writing (April 12) Tether has not released its March 31<sup>st</sup> audit report that would show any changes in the distribution of commercial paper after the major downgrades in the Chinese real estate sector earlier this year.

# Redeploying collateral is extremely risky because shocks hit hard and fast and often require liquidating billions in just a few hours.

Gary Gorton<sup>1</sup> and Jeffery Zhang<sup>2</sup> argue that, similar to early banking attempts in the 1840s, “privately produced monies are not an effective medium of exchange because they are not always accepted at par and are subject to runs.”



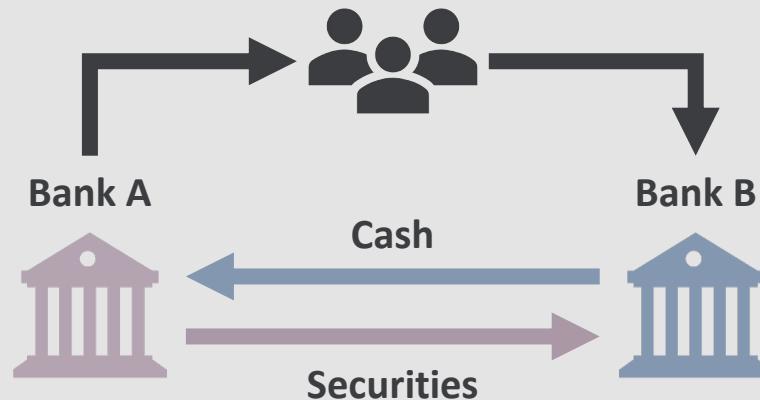
Luckily this wasn't a run on the stablecoin and the price proportionality held but it demonstrates the nonlinear relationship that can occur during runs. At its worst, the price of Neutrino was trading at a 25% discount to the dollar. In order to correct that, it required burning 53% of WAVES's total market cap. On the first day, nearly \$1B of WAVES was liquidated and in just 48 hours buyers needed to be found to purchase \$1.8B of WAVES market cap. Luckily enough buyers were found, but it demonstrates how quickly and sharply price pressure escalates and the speed of the feedback loop.

Traditional banks also have measures in place to mitigate liquidity risks and manage runs. Specifically, highly liquid interbank overnight exchanges and repurchase agreements.

Banks cover each other's liquidity needs in order to cover shortfalls and ensure that capital can be efficiently deployed.

(1) A net imbalance has resulted in users withdrawing money from Bank A and depositing it in Bank B

(2) Bank A has a shortfall of liquid assets to provide all the users with their cash. They can't sell their securities on the open market as that will tank the price of their assets.



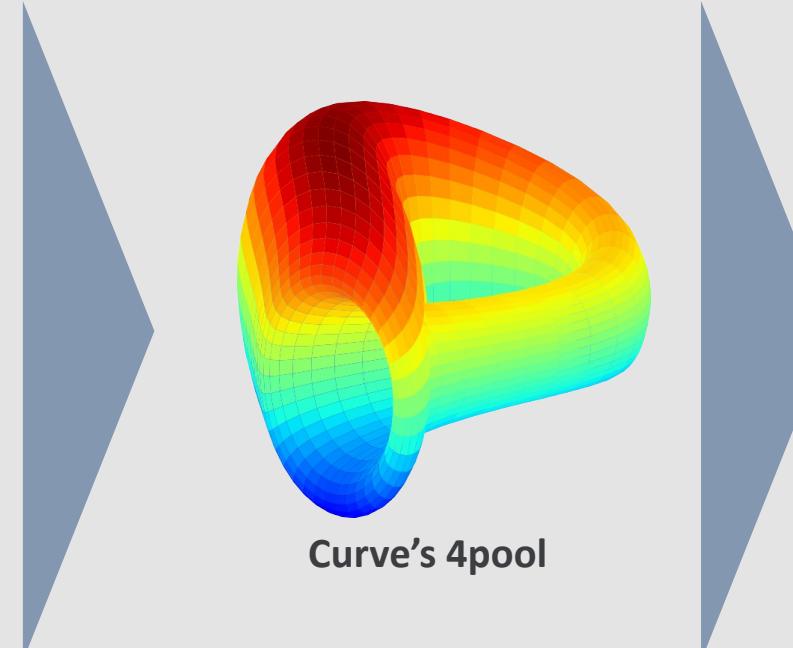
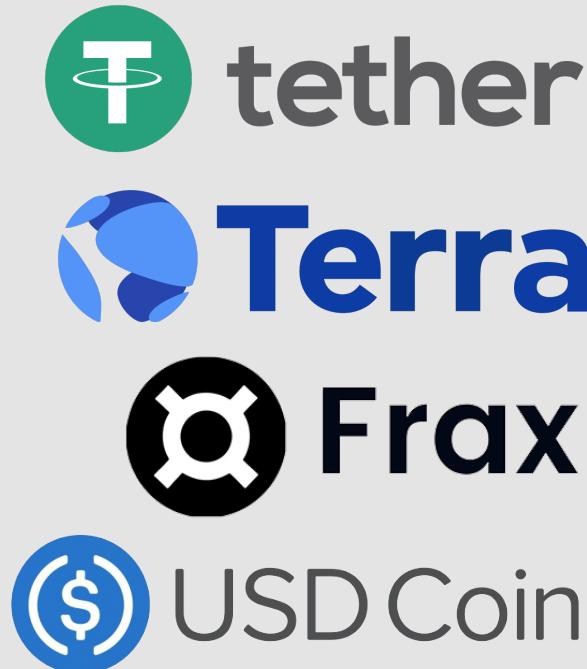
(3) Bank B meanwhile has too much cash and is no longer capital efficient. If this cash isn't quickly deployed, Bank B won't be able to make interest on its deposits.

(4) These two Banks recognize that they can solve each others problems and enter into a mutually beneficial arrangement to solve their respective issues. Bank A temporarily loans Bank B some of its outstanding securities, and Bank B loans Bank A the cash equivalent to the value of the security. Bank A has promised to buy back those securities in the future, as it slowly rebalances its balance sheet for the original purchase price plus some additional interest.

This arrangement, a sale of securities with a promise to buy it back is called a repurchase agreement or "repo" for short, and is integral to the functioning of modern banking infrastructure. These operations are constantly conducted on the repo market, a \$4+ Trillion USD market, and the interest rate banks are willing to lend to each other at, is one of the primary ways to calculate the risk-free rate at any given time. These rates impact everything from financial derivatives to mortgages and are often cited and closely tracked (In Europe it's the Repo Funds Rate (RFR) which is currently negative). Banks can also loan to each other without security as collateral (In the US, this is done at the fed funds rate, and in the UK is the London Interbank Overnight Rate, (LIBOR)).

Stablecoins don't have an equivalent liquidity market. However, there are signs that it may be possible to develop a similar repo market that will help stabilize liquidity risks.

"4pool" is a recent development where several stablecoins are partnering to provide a public liquidity pool.

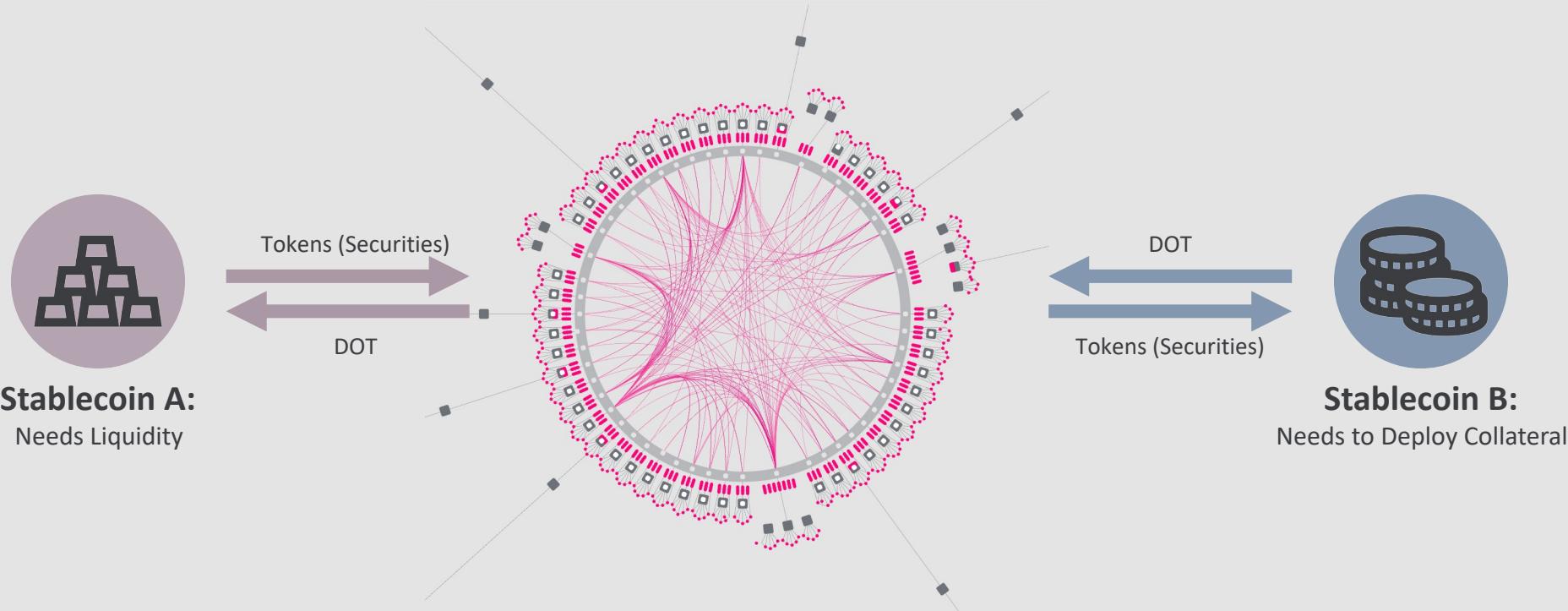


Today, this pooled liquidity is intended primarily for end users, not the stablecoins themselves. However, it isn't a stretch to adapt such a pool to replicate the functions of modern repo markets and provide stablecoins a way to secure additional liquidity in exchange for securities.

The primary limitation to using 4pool for that function today is agreeing on the base currency. In traditional markets, USD is an easily agreed upon common currency of repo markets and it will be difficult to get competing stablecoins to agree on whose token should be the base currency that underpins this new repo market and which tokens should be considered "securities".

# Parachain networks like Polkadot and Cosmos are very well positioned to facilitate this sort of liquidity market making functionality.

Polkadot's architecture is well positioned to function as a repo market amongst multiple stablecoins.



The central relay chain of Polkadot can act as a central repo market where all stablecoins come to resolve liquidity challenges. By using DOT as the common currency, it should allow stablecoins to perform open market operations to manage liquidity issues as long as DOT retains some value. Here if Stablecoin A needs liquidity, it can borrow some of Stablecoin B's collateral for liquidity and pay for it in DOT with the promise to return that collateral in the future with interest.

# A second challenge to the modern stablecoin network is its high cross exposure meaning that any instability would quickly spread across the ecosystem.



## Poor Capital Efficiency

Collateralized Stablecoins historically have been very capital inefficient. Overcollateralizing ultimately encumbers more liquidity than it creates decreasing the overall capital available in financial crypto markets.

Algorithmic stablecoin projects offer a time-proven solution that has worked in the traditional financial world, and is purely capital and liquidity additive. However this comes with the challenge of runs and hyperinflation as the assets are not backed by collateral.



## High Cross-Correlations

Many stablecoin projects like DAI are directly dependent on other stablecoin projects for their stability. This creates cross links that could cause amplify shocks across the entire ecosystem similar to the 2008 Financial crisis.

Both fiat-backed stablecoin projects and purely algorithmic stablecoin projects offer some degree of diversification, however the situation is more complex with some algorithmic stablecoins, such as Terra which is partially collateralized with and exposed to BTC.



## Algorithmic Supply Reduction

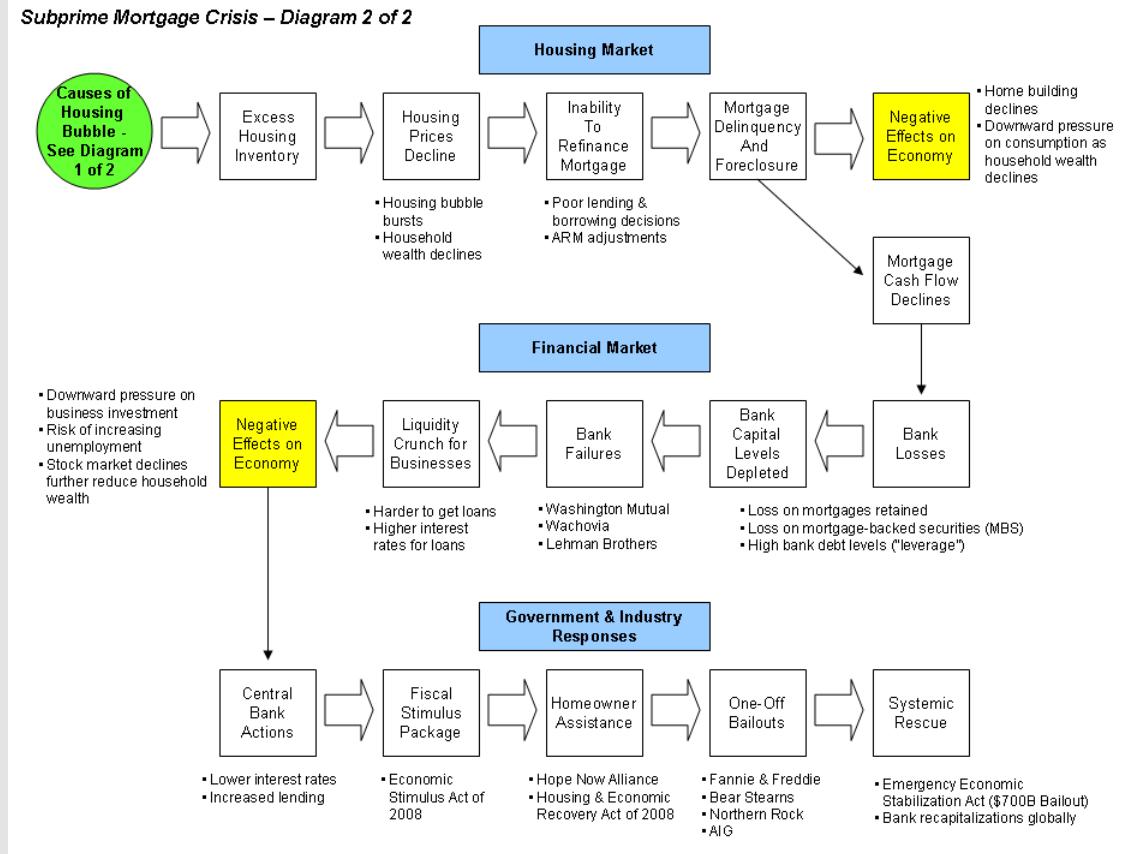
Most multi-coin algorithmic stablecoin projects struggle to reduce token supply, especially at the speed at which demand curves can change. Rebasing models can, but it comes at the cost of sacrificing a wallet's stable value.

Both fiat-backed stablecoin projects and over-collateralized stablecoin projects simply respond to demand and automatically liquidate supply when it is unneeded through token redemptions for either the posted collateral or the custodied assets.

# One of the biggest learnings of 2008 was the impact of hidden group correlations. An overlooked but endemic exposure to real estate resulted in a complete meltdown of seemingly diversified portfolios.

This phenomena is called "Financial Contagion" and results in risk quickly spreading through the entire market.

## 2008 Financial Crisis Summary



Source: Wikipedia "Financial Contagion"

[https://en.wikipedia.org/wiki/Financial\\_contagion](https://en.wikipedia.org/wiki/Financial_contagion)

## Most Companies and Institutions Had Huge Exposure to Real Estate Assets and Mortgage Backed Securities:

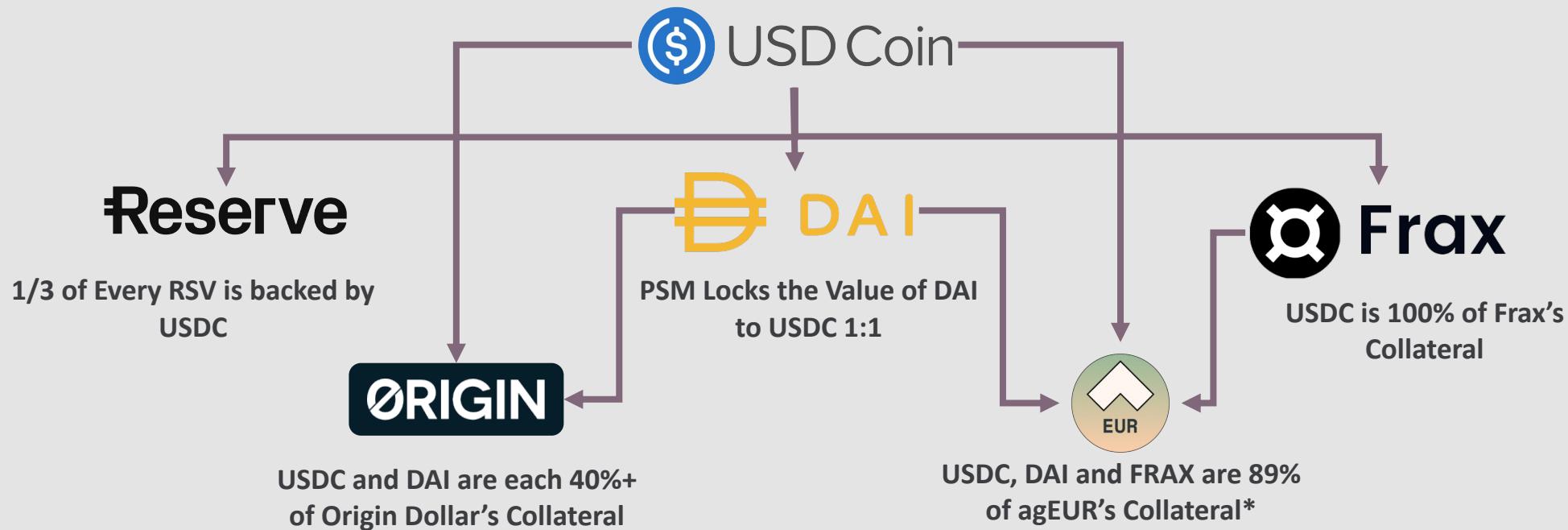
The primary cause for the severity of the 2008 global financial crisis was endemic exposure to real estate, whether it was banks who directly held mortgages, investors who held mortgage backed securities in their portfolios, or insurance companies such as AIG that issued financial derivatives on the aforementioned securities. The cross-correlations that resulted in this massive endemic exposure to real estate nearly caused the collapse of the entire financial industry through the knock on effects once banks themselves became insolvent.

## The Fallout of Contagion Usually Results In Strict Regulations:

Financial contagion is one of the main causes of financial regulation. A top priority for both domestic financial regulators and international organizations is to prevent financial contagion using regulations. This priority was especially important in the fallout of the 2008 financial crisis, when global economies were under challenge from the U.S. subprime mortgage crisis and European sovereign debt crisis.

Replicating the issue of an endemic exposure to real estate assets, nearly every extent USD stablecoin in the modern ecosystem is directly or indirectly reliant on Tether and/or USDC.

USD Coin Serves as Collateral For Multiple Other Stablecoins



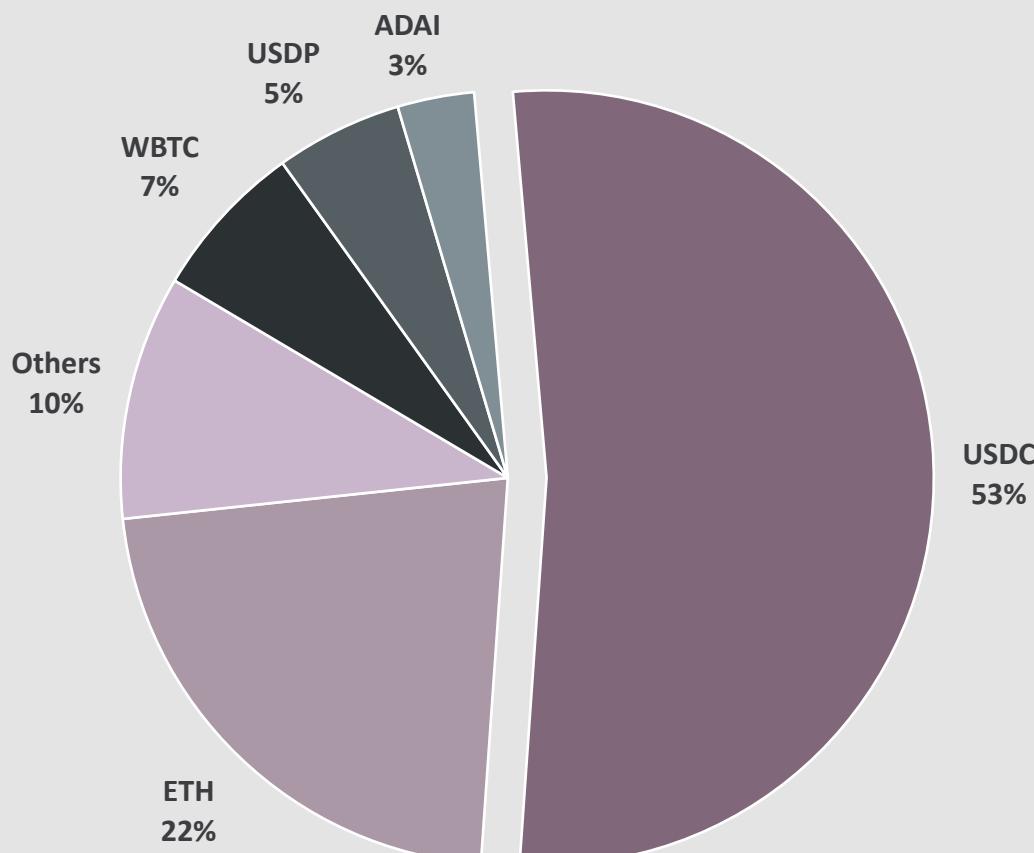
\*Note that agEUR which is pegged to the EURO, only has USD pegged Collateral

### Stablecoins today are incredibly entangled much like Real Estate in 2008:

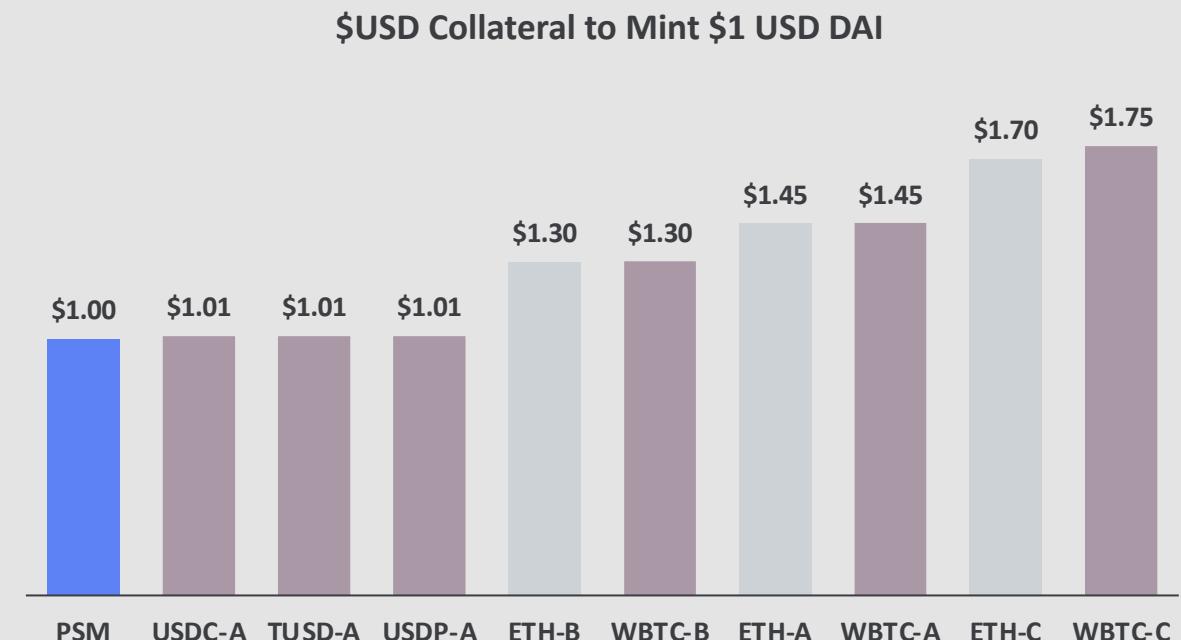
Whether intentional or accidental, most stablecoins today maintain direct exposure to custodied stablecoins like USDC, TrueUSD or Tether. Any fluctuation or impact on their prices would immediately impact the prices of the stablecoins as DAI, Frax, and others. In addition, due to their perceived stability, they have low overcollateralization rates (101% collateral ratio for USDC) so any shock in their price would quickly trigger liquidations in many collateral pools which in turn would bring further pricing pressure. This is a risk because USDC is not backed 1:1 by cash, instead it's been deployed into the broader capital market (<https://www.bloomberg.com/news/articles/2021-08-11/coinbase-drops-promise-of-token-s-cash-backing-that-wasn-t-true>)

Many stablecoins are directly dependent on each other. As an example, 53% of DAI tokens are backed by USDC and PSM links its price 1:1 for all practical purposes.

DAI Tokens Issued by Collateral Type



USDC is the Most Efficient Collateral by Far



USD Coin, True USD, and Pax Dollar all have minimal overcollateralization requirements, requiring only 1% additional collateral to mint a DAI. This is compared to 70% overcollateralization for the C buckets of Ether or Bitcoin. This also means that at max utilization, it's in danger of liquidation with even relatively small amounts of volatility. Note though that most USDC has come through the PSM meaning that most DAI today is functionally equivalent to wrapped USDC.

# Algorithmic stablecoins are the latest innovation and promise to solve many of the previous issues, however many struggle to shrink money supply as quickly as demand shocks can occur.



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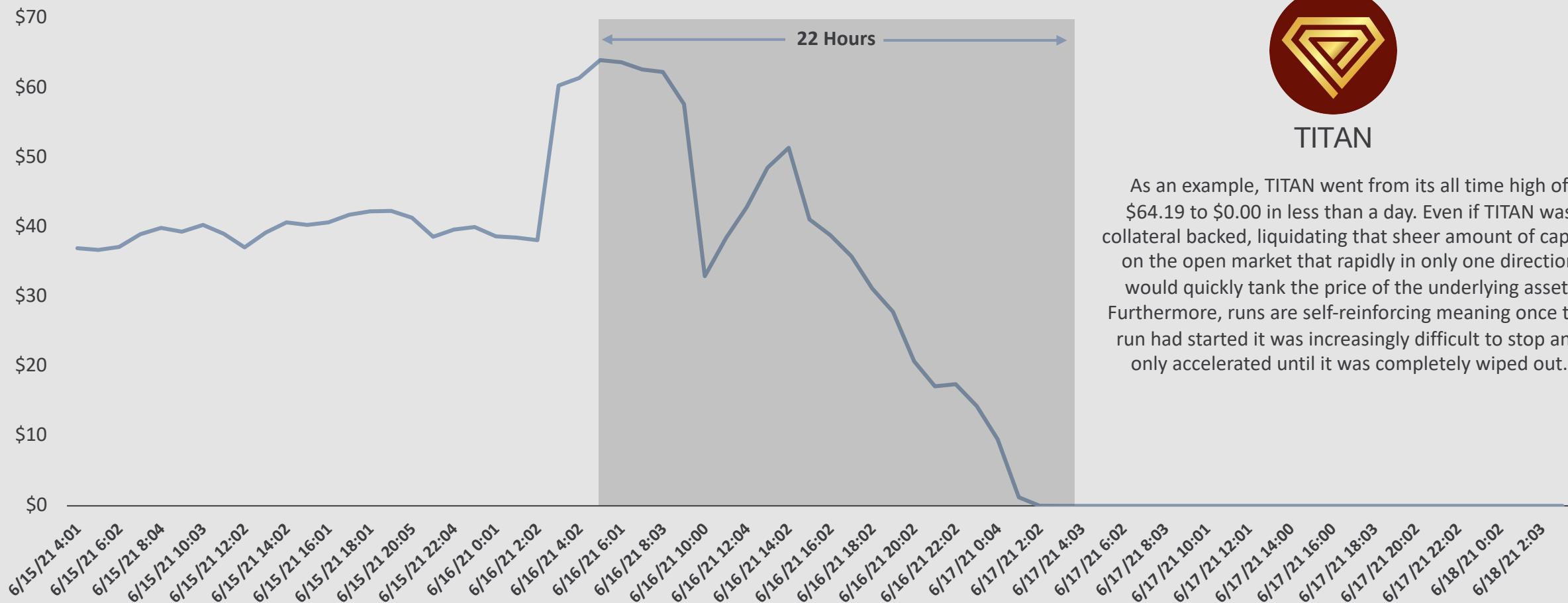
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Both fiat-backed stablecoin projects and over-collateralized stablecoin projects simply respond to demand and automatically liquidate supply through token redemptions for either the posted collateral or the custodied assets.

Contractions and runs on algo stablecoins have historically hit fast, in many cases rendering the currency worthless overnight. TITAN went from \$62 to \$0 in just 22 hours.

### Summary

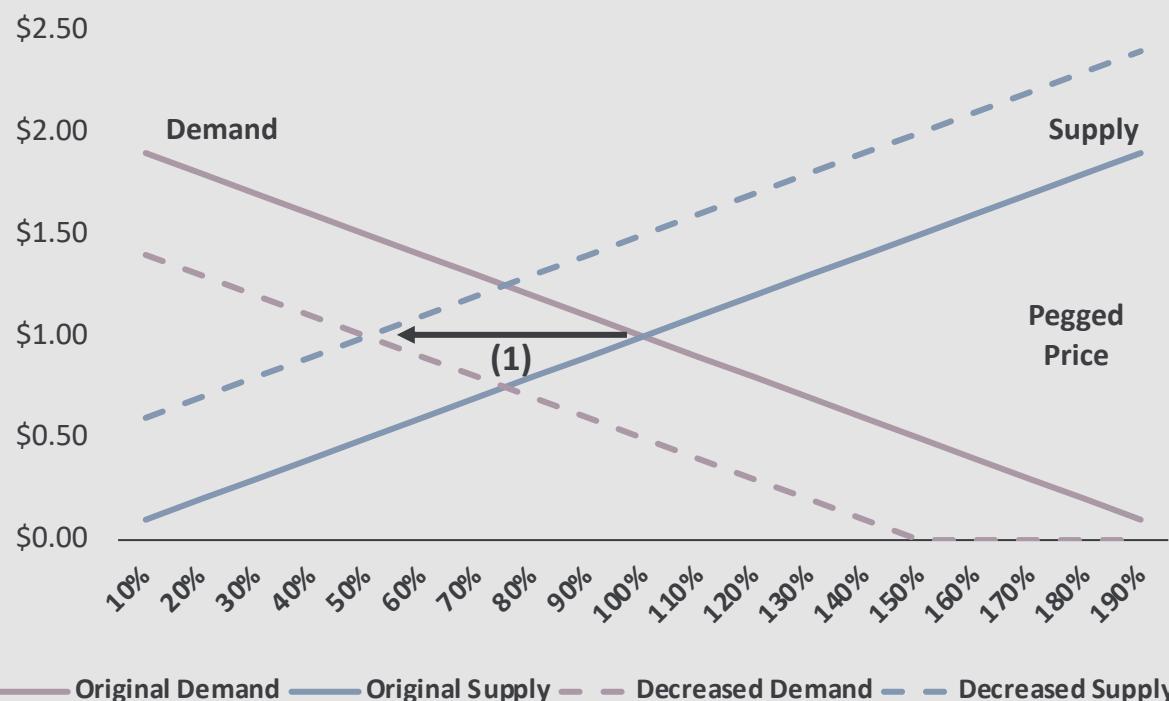


TITAN

As an example, TITAN went from its all time high of \$64.19 to \$0.00 in less than a day. Even if TITAN was collateral backed, liquidating that sheer amount of capital on the open market that rapidly in only one direction would quickly tank the price of the underlying asset. Furthermore, runs are self-reinforcing meaning once the run had started it was increasingly difficult to stop and only accelerated until it was completely wiped out.

# The primary reasons crashes happen are two fold. First, Algorithmic coins struggle to reduce supply as quickly and sharply as demand for stablecoins can drop off.

Vanishing demand is an unsolved problem in traditional finance as fiat currency has some intrinsic demand.



Even small demand shocks require large supply contractions. Here we can see that to correct an imbalance, 50% of supply needed to be removed from the market (1), similar to what happened with Neutrino. In addition, unlike with Luna, currencies that don't have a particular use case or utility can see demand completely dry up in a matter of hours like with TITAN.

## Possible Solutions

### Bond Buybacks:

Similar to the Federal Reserve, Terra and other multi-coin tokens have a natural stabilization mechanism where the 'bond' token can be redeemed for the 'share' token and vice versa to help stabilize the price. It generally is effective, but relies on an underlying demand for the 'bond' token. If that doesn't exist, the entire coin can collapse like IRON.

### Use Utility To Create Consistent Demand:

Terra uses Luna as its native layer 1 token. As Luna is used to pay gas fees, it has a consistent baseline level of demand as long users want to utilize the network.

### Foreign Currency Reserves:

In order to prevent the 'bond' token from completely losing all value many of these currencies also hold baskets of currencies to perform open market operations to buy back supply. This allows them to quickly repurchase outstanding shares and decrease the money supply maintaining stability as a final fallback option.

### Slow Down Redemptions:

It is possible to slow down redemptions that are coming out of the network, a good example of this are the layer 2 optimistic rollups on Ethereum that often have 1-2 week withdrawal periods where you are limited in how fast you can pull money off the network. Tether uses KYC and additional overhead to slowdown how quickly dollars can be pulled out of their network.

# A second reason crashes accelerate quickly is liquidating collateral depresses the price and can in turn lead to further liquidations in other collateral pools in a rapidly accelerating spiral.

Here even moderate instability in the price of USDC can quickly snowball into a run on the coin.



Collateral pools can quickly spiral as liquidations can have unanticipated and unintended knock on effects as the open market operations that liquidate collateral start depressing the prices of those assets, causing further liquidations in a spiral. This isn't a theoretical concept, this is the primary reason that DAI was so unstable and had to launch the PSM which created a permanent 1:1 USDC to DAI exchange.

# In addition, as they are entirely smart contract based, algorithmically managed coins are vulnerable to bugs in the underlying code unlike custodied tokens where fiat dollar transfers can be recalled.

While bugs are not unique to algorithmic coins, their size and scale makes them the most attractive targets.

## Cashio (\$50M+, March 2022):

A Solana-native stablecoin lost \$50M to an “infinite mint glitch” that allowed a hacker to mint unlimited currency and withdraw the collateral out of the pool. The hacker was able to withdraw approximately \$52.8M, but as of writing the full postmortem has not been completed.

## Origin Dollar (\$7M, Nov 2020):

Origin Dollar (OUSD) was also susceptible to a “reentrancy attack” which allowed hackers to steal \$7M in November 2020.

## SafeDollar (\$250K, Jun 2021):

SafeDollar was also susceptible to an “infinite mint glitch” and lost \$250K to hackers in June 2021. There is some suspicion however that this was committed by an insider.

Even a trivial oversight in the source code has resulted in millions of dollars in losses for multiple stablecoin projects.

Matthew Liu (@matthewliu.eth) • ...  
@matthewliu  
Unfortunately OUSD was hacked 2 hours ago and there has been a loss of funds. The [@OriginProtocol](#) team is all-hands on deck working on resolving this issue. Please do not buy or mint OUSD right now. New updates will be coming every few minutes.

Mudit Gupta (@Mudit\_Gupta) • ...  
SafeDollar was exploited today and dumped on the open market for ~\$250k. It was an infinite mint exploit. The market cap of [\\$SDO](#) was ~\$248mm but there was just \$250k in exit liquidity.. The attack happened because SafeDollar incentivized a token that has a fee on transfer.

function \_move(  
 address \_operator, address from, address to, uint256 amount, b  
) internal override returns (uint256 \_amountSent) {  
 \_beforeTokenTransfer(\_operator, from, to, amount);  
 uint256 amount = \_amount;

Pinned Tweet  
Cashio (\$CASH) • @CashioApp · Mar 23  
Please do not mint any CASH. There is an infinite mint glitch.  
We are investigating the issue and we believe we have found the root cause. Please withdraw your funds from pools. We will publish a postmortem ASAP.

101 330 462

Show this thread

# A further complication is upcoming regulatory actions, a topic for a subsequent deep dive.

Stablecoins are a strong focus for upcoming regulations from both the EU and US Federal Government

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## Predominant Impact in EU will be through MiCA:

*“Digital finance: Markets in Crypto-assets (MiCA)”* is regulation to “establish a new fully harmonised EU legal framework regarding the proper functioning of crypto-asset markets”.

## Stablecoins Will See Heavy Regulation:

This proposal includes safeguards to address potential risks to financial stability and orderly monetary policy that could arise from ‘stablecoins’. Safeguards include capital requirements, custody of assets, a mandatory complaint holder procedure available to investors, and rights of the investor against the issuer. Issuers of significant asset-backed crypto-assets (so-called global ‘stablecoins’) shall be subject to more stringent requirements (e.g. in terms of capital, investor rights and supervision).



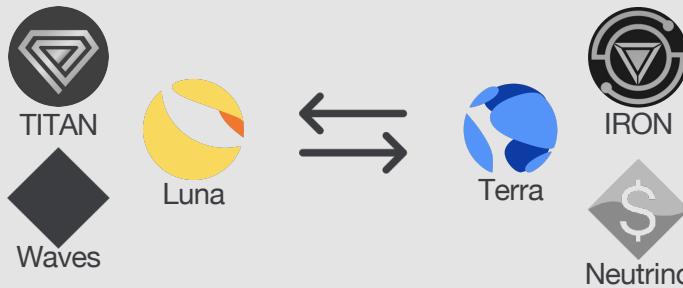
## Most American Regulations Are Still Being Formed:

We can see some of the early focus on stability and conformity of stablecoins in the Treasury’s Report on Stablecoins.

## Stablecoins Are Also A Heavy Focus in the US:

The US proposals include safeguards to address risks to stablecoin users and guard against stablecoin runs, concerns about payment system risk, and additional concerns about systemic risk and concentration of economic power. It’s currently further from proposing and passing concrete regulations than the EU. The closest proposal is the Stablecoin Innovation and Protection Act of 2022, which has only been published as a working draft by representative Gottheimer.

Based on the results of our analysis, we recommend establishing certain key functions for capital-efficiency and long-term stability in an algorithmically managed token.



## Multi-Token Model with Intrinsic Demand

The most successful model of an algorithmic coin seems to be a multi-coin model based on the principles of central reserve banking. One of the **KEY** factors is that the bond token must have an intrinsic use case such as Luna being used as the native token of Terra.

## Liquidity Market For Repurchase Open Market Operations

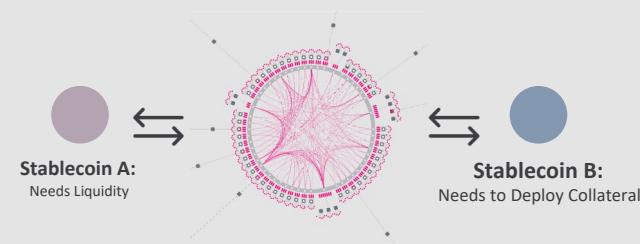
In order to provide additional security against liquidity risk and ensure optimal capital efficiency, these multi-token stablecoins should be allowed to participate in centralized repo markets in order to manage their liquidity and token needs.

These repo markets need an objectively useful reserve currency to act as the base currency for all transactions on the repo market. While the function of the network will be to exchange stablecoins and bond tokens, every transaction and its interest and settlement should all be denominated in DOT on the Polkadot network.

## Considerations

Demand for the bond token is what underpins the stability of the network and must be relatively consistent. A native currency is a good example for a bond token as it is necessary to perform actions on the network.

These multi-token coins should have a fixed reserve ratio requirement of DOT in order to both serve as a backstop of foreign currency reserve, and to perform repurchase operations on the central repo market.



## Supply Should be Deflationary with Controlled New Issuance

One of the primary features we believe that will help to stabilize the supply overtime is to burn a significant portion of the gas fees of every transaction. To balance this, a central treasury should issue and distribute new coins through a method such as staking.

This allows us to ensure that the supply is naturally contracting overtime. This creates an effect similar to how governments rely on the growth of their underlying economy to stimulate demand for money for transactions, except instead of the gradual growth of an economy, we have the gradual contraction of currency supply. This is counterbalanced by the central bank or governance model minting and issuing new capital to balance demand.



# STARDUST

In a future report we will provide a detailed architecture for implementing a robust Multi-Token standard on the Polkadot network.

For any questions, please reach out to us at:

Theresa Garcia ([Theresa@stardustfunds.com](mailto:Theresa@stardustfunds.com))

Adit Patel ([adit.patel@stardustfunds.com](mailto:adit.patel@stardustfunds.com))