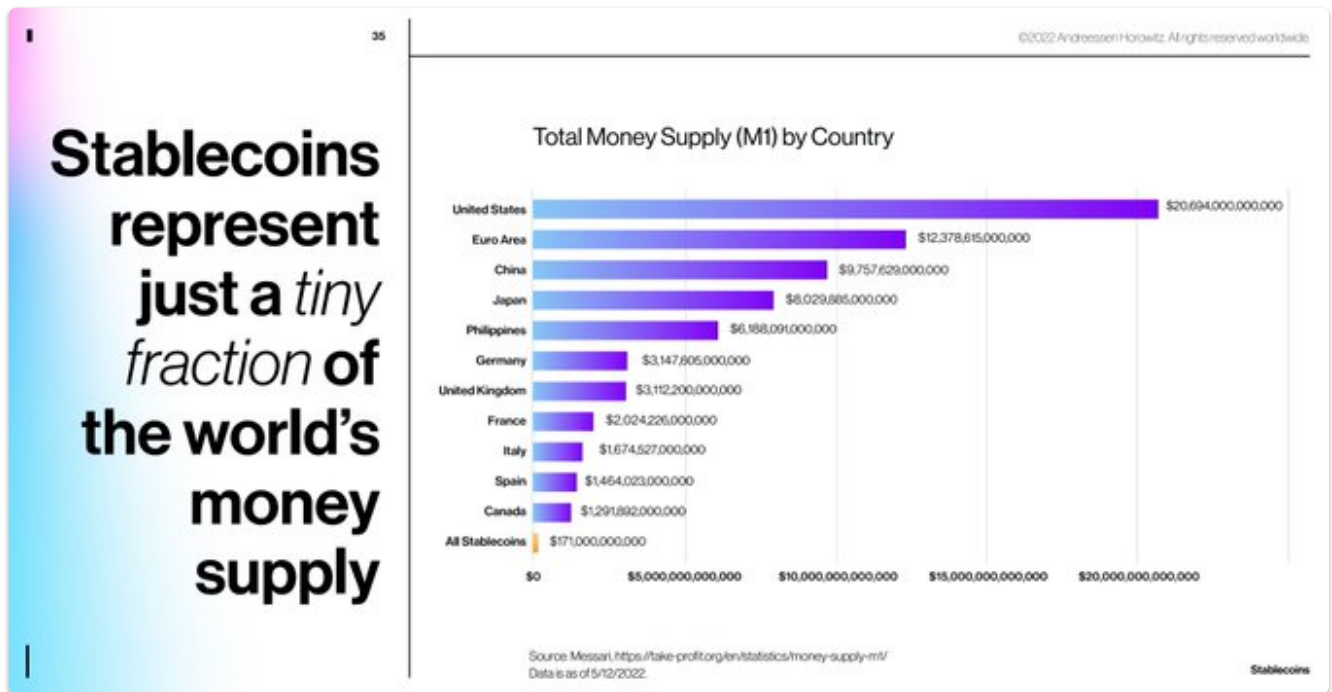












Lesson 17 - Stablecoins



This screenshot from May 12th shows that the problems of maintaining a peg is widespread

#	Coin	Price	24h Volume	Exchanges	Market Capitalization
☆ 1	 Tether USDT	\$0.997248	\$175,736,343,052	333	\$82,039,445,114
☆ 2	 USD Coin USDC	\$1.01	\$30,304,157,484	283	\$49,033,893,924
☆ 3	 Binance USD BUSD	\$1.00	\$20,307,488,741	107	\$16,791,171,922
☆ 4	 Dai DAI	\$1.01	\$4,023,465,626	189	\$6,009,272,965
☆ 5	 TerraUSD UST	\$0.556812	\$5,272,643,453	47	\$6,015,925,233
☆ 6	 Frax FRAX	\$0.990799	\$381,409,099	20	\$1,964,011,559
☆ 7	 Magic Internet Money MIM	\$0.994833	\$303,426,034	31	\$1,819,839,406
☆ 8	 TrueUSD TUSD	\$1.00	\$1,047,431,622	73	\$1,295,754,437
☆ 9	 Pax Dollar USDP	\$1.00	\$1,160,375,584	36	\$978,199,048
☆ 10	 Neutrino USD USDN	\$0.761652	\$47,257,926	8	\$706,346,413


Tether to USD Chart

Price **Market Cap** TradingView

1D 7D **1M** 3M 1Y YTD ALL  | LOG




UST Crash





devops199 commented on 9 May 2022 • edited by devops199


I accidentally depegged it.


<https://etherscan.io/tx/0x5d96604aa9294e269fc630bcb7b7f020eb62e275e63572a8839fde7cf9ffb510>


 75


 4


 124

 65

 25

 52

 3

 4

Is UST in a DEATH SPIRAL today?

@UstDeathSpiral

Daily tweets to see if **\$UST** is in a death spiral.

 Hell  Joined March 2022

20 Following **1,603** Followers

Not followed by anyone you're following

Tweets

Tweets & replies

Media

Likes



Is UST in a DEATH SPIRAL today? @UstDeathSpiral · May 12

YES

 99

 374

 2,248



 Tip



Arian Klages-Mundt
@aklamun



The Terra UST stablecoin could collapse in a bank run effect. UST is backed by an endogenous collateral Luna. Current Luna marketcap has fallen to arguably < outstanding UST. We are now in a dangerous spiral: as users panic out of UST, this reinforces the Luna crash further.

TerraUSD Chart



Price Market Cap TradingView

1D 7D 1M 3M 1Y YTD ALL LOG



12:55 AM · May 24, 2021 · Twitter Web App

From Decrypt [article](#)

LUNA, formerly a top 10 coin by market cap, fell 100% to [fraction of a fraction of a cent](#), and UST, designed to stay pegged at \$1, [bottomed out](#) at 13 cents.

[Before the crash](#)

On April 18, UST flipped Binance USD to become the third-largest stablecoin on the market after Tether and USD Coin based on market capitalization.

TerraUSD Price Chart (UST)

Price

Market Cap

TradingView

24h

7d

14d

30d

90d

180d

1y

Max



Logarithmic

Linear



Oct 2, 2020

→ Apr 18, 2022

\$20,000,000,000

\$15,000,000,000

\$10,000,000,000

\$5,000,000,000

\$0.00



Nov '20 Jan '21 Mar '21 May '21 Jul '21 Sep '21 Nov '21 Jan '22 Mar '22



Luna and UST Price During De-peg Event



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glassnode

Background

UST is a fully algorithmic stablecoin, [intended to maintain stability through a 1:1 mint and redeem mechanism](#).

Here's how it works.

1. To mint UST, a user must burn an equal amount of LUNA (e.g. burn \$1 of LUNA to mint \$1 of UST).
2. To exit the system, a user can redeem their UST for a commensurate amount of LUNA.

This means that when the stablecoin is trading above peg, i.e. greater than \$1, arbitrageurs are incentivized to come in and capture the difference between its current price and \$1 by burning LUNA, increasing the supply of UST and lowering its price.

This same mechanism is also employed when LUNA is trading below \$1. In that scenario, an arbitrageur can redeem UST for \$1 of LUNA, similarly capturing the difference between the market price of UST and its intended peg, in doing so increasing the price of UST through decreasing its supply.

Anchor protocol

May 07 - \$16.7 TVL

From [Decrypt article 23rd April 2022](https://decrypt.co/98482/we-need-to-talk-about-terras-anchor)<https://decrypt.co/98482/we-need-to-talk-about-terras-anchor>

Anchor, Terra's most popular project, is basically a high-interest savings account for TerraUSD (UST) stablecoins.

You can earn a steady rate of 19.46% for deposits.

More than 72% of all UST is currently deposited in Anchor.

This frenzied, Anchor-driven demand for UST is also part of the reason behind the stablecoin's blazing expansion and perhaps the excellent price action of Terra's native LUNA token.

In November, UST's market cap was just \$2.73 billion—now it's \$17.8 billion. During that same time, LUNA has also doubled from a price of roughly \$50.



The interest rate however was designed to fall 1.5 percentage points each month if there were more lenders than borrowers on the platform

Once it became clear that that 20% interest wasn't going to last, UST holders began to leave.

On Friday, May 6, there was roughly 14 billion UST in Anchor. By Sunday, this figure was 11.7 billion.

UST was still pretty much pegged to the dollar at that point, which means roughly \$2.3 billion in capital left over the course of that weekend.

To exit UST, you have two options.

1. Burn-and-mint mechanism.

This mechanism lets holders swap 1 UST for \$1 of LUNA, destroying the UST in the process. This creates an arbitrage opportunity whenever 1 UST falls below \$1, as speculators can buy the discounted UST and trade it in for \$1 in LUNA, making a small profit. The opposite is also true: If UST trades above \$1, you can swap (and burn) \$1 of LUNA for that UST.

2. Using the stablecoin exchange Curve Finance.

Typically, when a stablecoin faces a minor price change, savvy arbitragers will head over to DeFi's deepest liquidity pools on Curve and trade the discounted stablecoin to whichever alternative has held its peg.

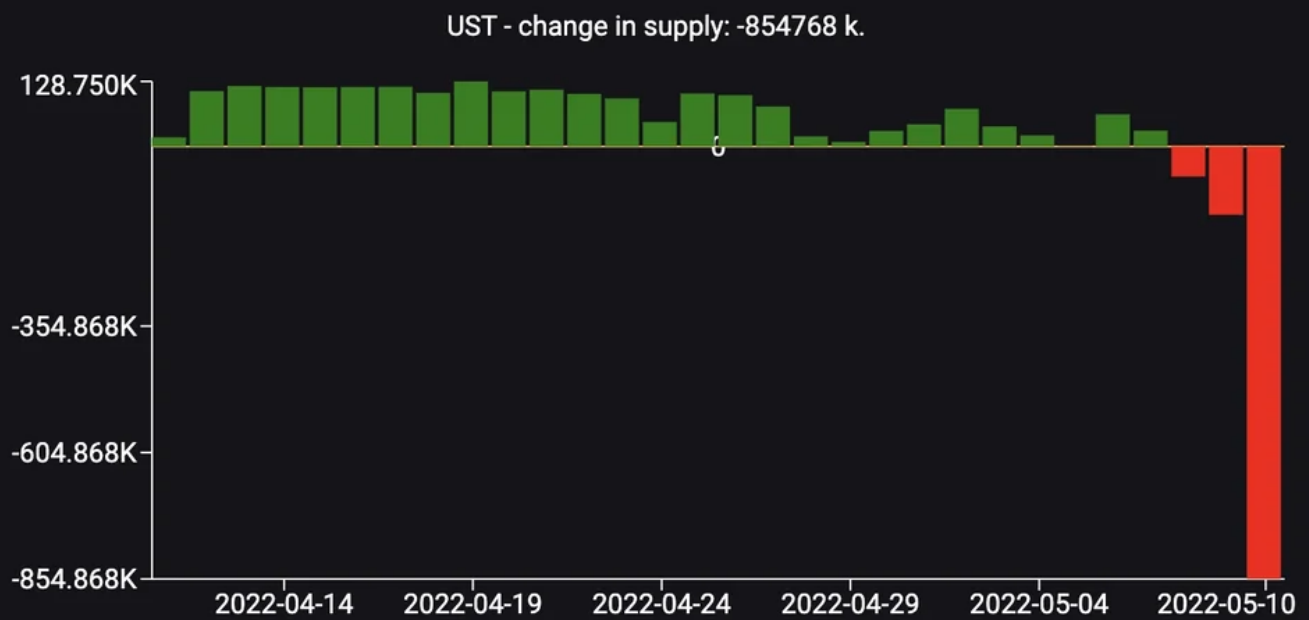
How these have worked in practice

Burn and Mint

Swapping and burning UST for LUNA means minting more LUNA, diluting the supply and dropping the price of this token. Additionally, as the price of LUNA drops, whenever you swap 1 UST for \$1 worth of LUNA, you steadily need more and more LUNA to hit that \$1 mark (which means minting even more LUNA).

At a certain point, the price of LUNA could drop so low that there simply isn't enough liquidity to provide an escape hatch for all that UST coming in.

Daily Change In Total UST Supply ('000s)



Daily Change In Total Luna Supply ('000s)



Option 2 using Curve

UST was in a Curve pool with DAI, USDT and USDC.

From: **1.00** Max: 0

(•) UST
() DAI
() USDC
() USDT

To: **0.09**

() UST
(•) DAI
() USDC
() USDT

Exchange rate UST/DAI (including fees): **0.0941**

[] Swap wrapped

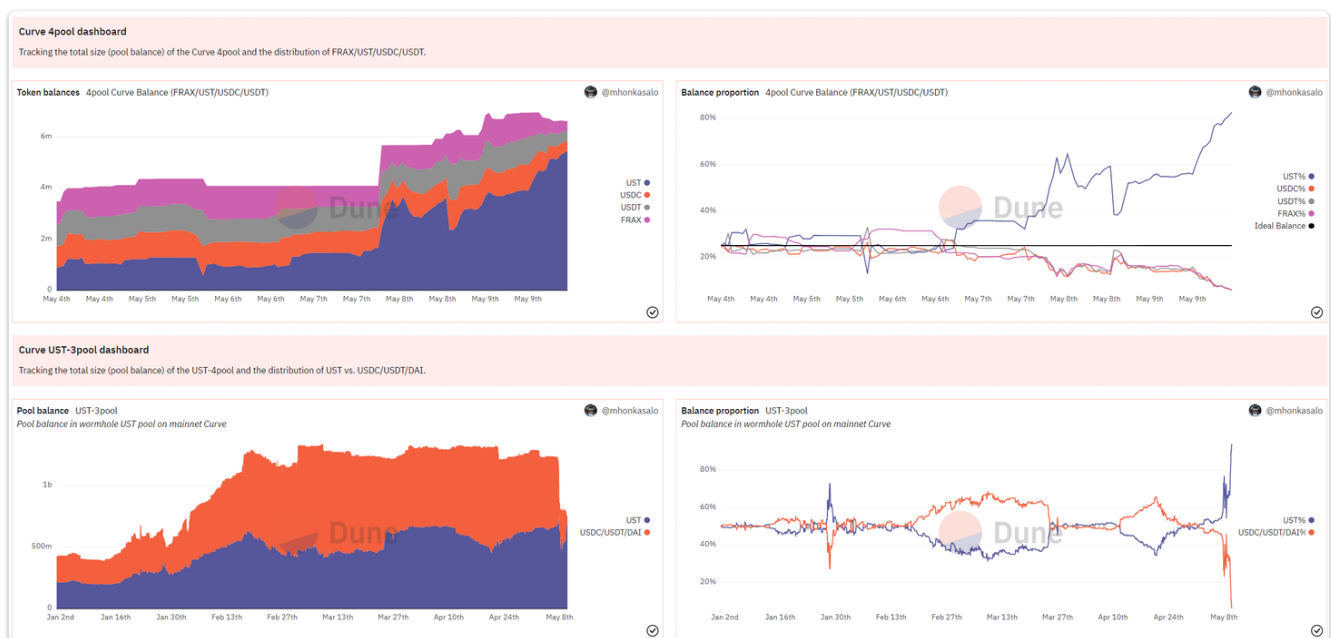
Advanced options ▼

Warning! Exchange rate is too low!

Sell

UST depegged by a little less than \$0.02 over the weekend as Anchor departees swooped in and began flipping UST for any other stablecoin, be it Tether's USDT or Circle's USDC.

Eventually, the specific pool that allowed for these trades (called the "UST + 3Crv" pool, which also pools all the major stablecoins) became unbalanced, meaning there was far more UST than the other stablecoins in the pool.



If you sell UST for USDC on Curve, you will add more UST to this pool and remove USDC. Eventually, the pool will have more UST than USDC. In order to correct course, the pool

then begins to offer that UST for a discount in hopes of getting arbitrageurs to make the opposite trade (and rebalance the pool).

This is in part why we began to see a slight depegging beginning on the weekend—Curve was doing what Curve is meant to do.

The problem in this specific case was that the opposite trade, the one that would rebalance the pool, wasn't happening. It appeared that, despite the relatively lucrative arbitrage trade, no one wanted to be holding UST, due on part to the waning interest in Anchor.

And at this time, at least one investor dumped more than 85 million UST tokens in exchange for 84.5 million USDC tokens in this pool. This, of course, put even more pressure on UST's dollar peg as Curve continued to create the discount hoping to incentivize arbitrage traders to rebalance the pool.

🚀 Swap 85,001,010 \$UST to 84,509,387 \$USDC (\$84,969,985)

LP & veCRV Holder Fee: \$33,988

💰 Tx Hash: <https://t.co/rbLEl4lndA> 🐕🐕🐕

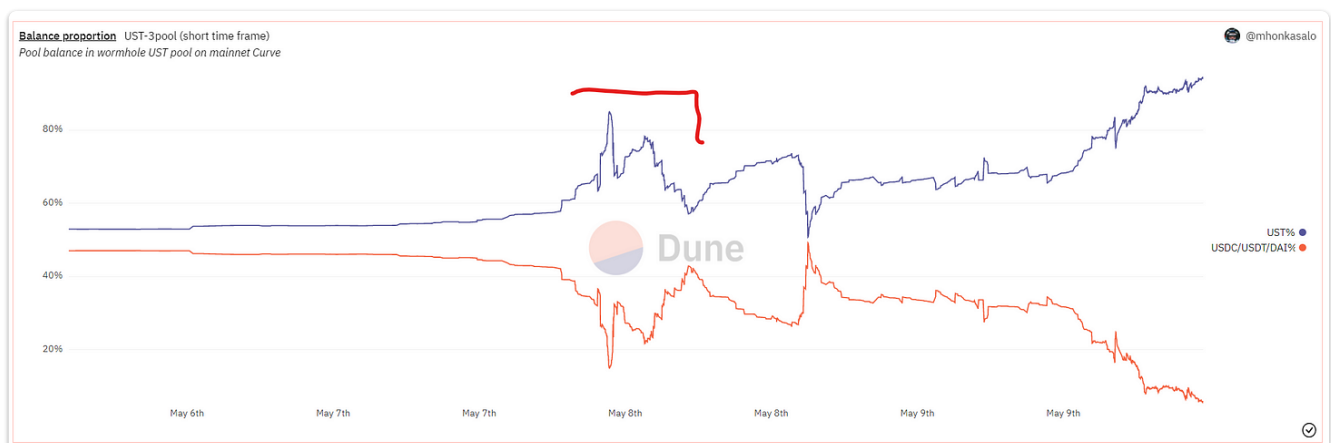
— Curve Whale Watching (@CurveSwaps) May 7, 2022

What was just a \$0.02 depeg on Sunday became a whopping \$0.32 by Tuesday. At the same time, the \$64 LUNA token fell below \$30.

It was also around this point that the market capitalization of UST edged toward overtaking LUNA's, which would mean the latter would no longer be able to absorb the former, creating a death spiral.

The Luna Foundation Guard (LFG) stepped in.

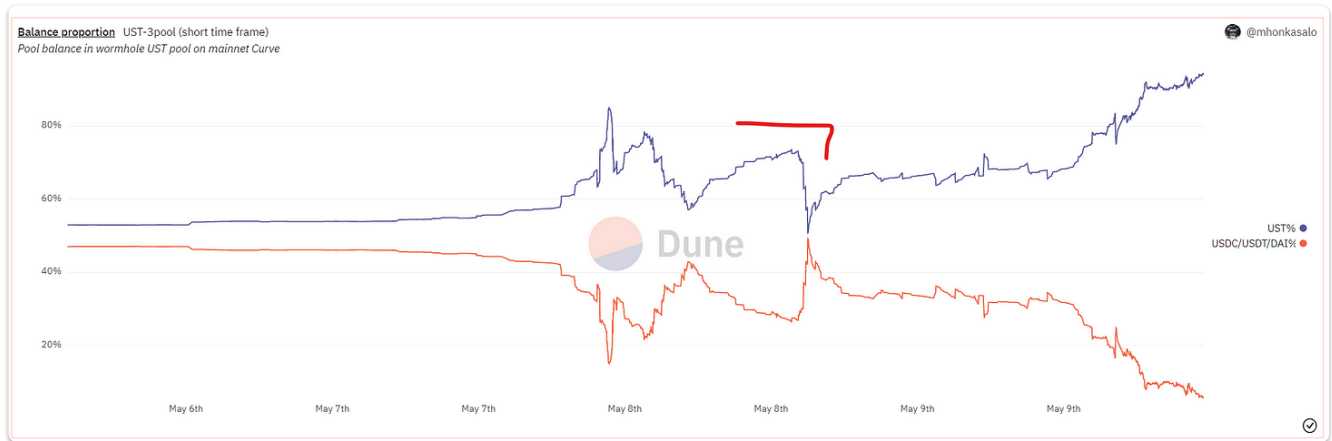
It dumped a ton of non-UST stablecoins (approximately [\\$216 million came from Jump Crypto](#), whose president is also on the LFG Council) into the Curve pool to help the stablecoin find its peg. It then reportedly began deploying the Bitcoin holdings that it's been stockpiling to a "professional market maker" who was essentially told to spend BTC when UST is below the peg (and vice versa if it ever trades above the peg).



And UST jumped from \$0.64 back to \$0.93.

Unfortunately, it was a brief reprieve. Exits through Curve ate through the bailout liquidity. It's also [unclear](#) whether that BTC was ever actually used to defend the peg.

The second stage was similar to the first. Constant swaps on Curve — mostly \$300k at a time and often from addresses that didn't look "malicious" but some random NFT trader.



Ultimately, LUNA's price continued to plummet as folks ditched UST and then sold their LUNA until, eventually, LUNA's price was so low that there wasn't enough runway for UST, creating an enormous amount of [bad debt](#).

Do Kwon and the Terra community [doubled down](#), and opened up how much LUNA can be minted at a time. But all this did was accelerate the spiral.

On May 8, LUNA had a 343 million circulating supply.

By May 12, that figure had ballooned to [32.3 billion](#) (and counting).

Despite the negative feedback loop, the Terra community proposed [three more emergency actions](#), which boil down to simply lighting as much UST on fire as possible (without having to mint LUNA on the other end).

Logarithmic Linear

May 4, 2022 → May 18, 2022



Eventually the Terra Blockchain halted to prevent governance attacks given the low costs of LUNA

**Terra (UST)**  **Powered by LUNA**  
@terra_money

The Terra blockchain has officially halted at block 7607789.

Terra Validators have halted the network to come up with a plan to reconstitute it.

More updates to come.

3:13 AM · May 13, 2022 · Twitter for iPhone

**Terra (UST)**  **Powered by LUNA**  
@terra_money

The Terra blockchain has resumed block production.

Validators have decided to disable on-chain swaps, and IBC channels are now closed.

Users are encouraged to bridge off-chain assets, such as bETH, to their native chains.

Note: Wormhole bridge is currently unavailable.

1:46 PM · May 13, 2022 · Twitter for iPhone

Knock on effects

\$200 billion of crypto value vaporized in 24 hours - more than the market cap of BTC in 2020

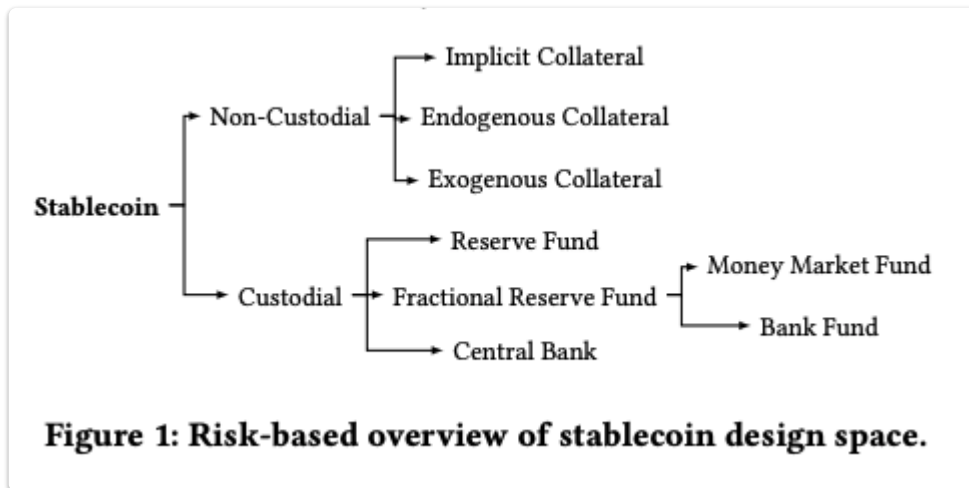
Stablecoin Theory

Paper

There are two classes of stablecoin: custodial, which require trust in a third party, and non-custodial, which replace this trust with economic mechanisms.

Major custodial examples such as Tether, Binance USD, USDC, and TrueUSD have a combined market capitalization of over USD 10bn.

On the non-custodial side, of the USD 1bn of value locked in so-called Decentralized Finance (DeFi) protocols, more than 50% are allocated to Maker's Dai stablecoin



Custodial

- Reserve Fund - TUSD, USDC, Libra v2

In Reserve Fund stablecoins, the stablecoin maintains a 100% reserve ratio—i.e., each stablecoin is backed by a unit of the reserve asset (e.g., 1 USD) held by the custodian

- Fractional Reserve Fund

A Fractional Reserve Fund stablecoin is backed by a mixture of reserve assets and other capital assets, and has a target price.

- Bank Fund - Tether
 - Money Market Fund - Libra v1
 - CDBC - Digital Yuan
-

Non Custodial

The collateral for these is of the following types

- Exogenous when the collateral has primary outside use cases
Stablecoins are issued against this collateral subject to a collateral factor that dictates the minimum overcollateralization allowed in the system.
- Endogenous when the collateral is created for the purpose of being collateral This means that it has few, if any, competing uses outside of the stablecoin system
- Implicit when the design lacks explicit collateralization.

Examples

- Exogenous - DAI
- Endogenous - Synthetix, Terra
- Implicit - Nu-Bits

There is something of a spectrum of exogenous and endogenous collateral, e.g. Steemit and Celo

A further dimension is the type of collateral used, this may be

- Fiat currency, such as USD
- Cryptocurrency
- Commodity - such as gold

2 Fundamental questions

1. (Incentive Security). Is there mutually profitable continued participation across all required parties?
If not, then the mechanism cannot work as no one will participate. This question also includes incentives around attacks; in particular, if incentives lead to profitable attacks, then rational agents will be less inclined to participate.
 2. (Economic Stability). Do the incentives actually lead to stable outcomes?
-

Composite Stablecoins

1. ETF stablecoins

An ETF type arbitrage mechanism is used to redeem the stablecoin against a basket of assets

2. DEX stablecoin

This aims to spread risk over the basket while providing an exchange service between the constituents, and so the basket weights change with exchange demand.

3. CDO stablecoin

This segregates stablecoin risk into tranches

4. A rainy day fund (RDF) stablecoin

This holds a basket of assets that accrues value to a safety buffer over time through arbitrage, fees, and other collateral uses.

Other stablecoins

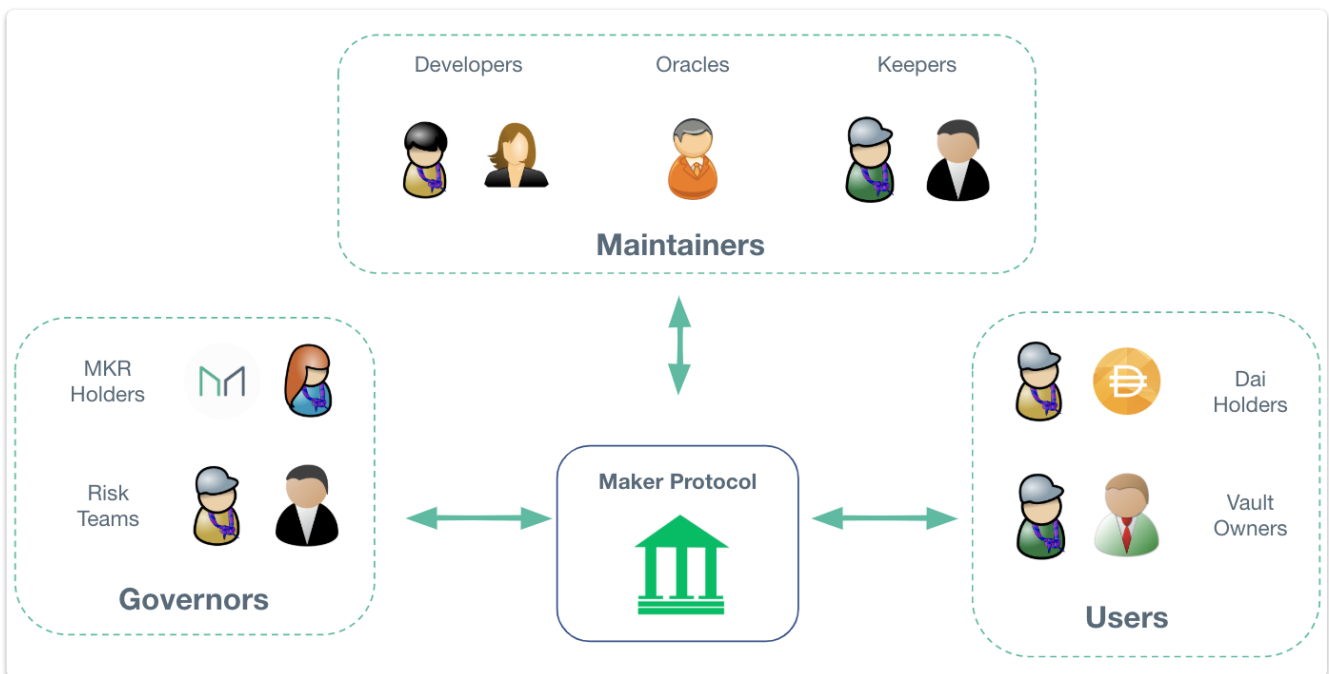
DAI

Dai is created from an overcollateralized loan and repayment process facilitated by MakerDAO's smart contracts.

Users who deposit Ether (or other cryptocurrencies accepted as collateral) are able to borrow against the value of their deposits and receive newly generated Dai.

The minimum collateralization ratio for Ether is currently set at 150%, or in other words, depositing \$150 worth of Ether allows one to borrow up to 100 Dai

Maker Protocol in [detail](#)



Dai - Economics

2

How does it keep its peg?

- Demand curve can shift due to market conditions, confidence of Dai holders, etc
- Supply curve is shifted through a permissionless credit factory on Ethereum
- Any actor can vary the supply of Dai through a Maker Vault
- The system was built so that these actors are incentivized to shift the supply curve to ensure that the price is close as possible to \$1



Dai - Vault

2

Maker Vault

- Borrow Dai through locking up crypto assets as collateral
- Repay Dai + fee to retrieve collateral
- Safe, over-collateralized Vault >



Dai - Vault

2

Liquidations

1. A Vault is automatically liquidated if the collateral value (in USD) falls too low
 2. Part of the collateral is auctioned off by the Protocol to cover the outstanding debt + penalty fee
 3. Dai is then burned by the Protocol to decrease the supply
- Vault owner receives the leftover collateral



System Lines of Defense

At any point, the system must have more value in collateral than value of Dai supply.

The following mechanisms help maintain system solvency:

1. Supply and Demand Supply and demand of Vaults (and thus Dai) is influenced by the Stability Fees, Dai Savings Rate, and Debt Ceiling adjustments.
2. Liquidation Any time the collateral value of a Vault gets closer to its debt, it becomes "riskier". The system liquidates Vaults that get too risky.
3. MKR Minting/Burning If MKR holders govern the Maker Protocol successfully, the Protocol will accrue Surplus Dai as Dai holders pay Stability Fees. On the other hand, if liquidations are inadequate, then the Protocol will accrue Bad Debt. Once this Surplus Dai / Bad Debt amount hits a threshold, as voted by MKR holders, then the Protocol will discharge Surplus Dai / Bad Debt through the Flapper / Flopper smart contract by buying and burning / minting and selling MKR, respectively.
4. Emergency Shutdown This is a process that is used as a last resort in cases of extreme market irrationality, attacks, or coordinated upgrades. Emergency Shutdown gracefully settles the Maker Platform while ensuring that all users, both Dai holders and Vault users, receive the net value of assets they are entitled to.

In March 2020, as a result of extraordinary market volatility, Dai experienced a deflationary deleveraging spiral that, at its peak, caused it to trade for up to \$1.11 before returning to its intended \$1.00 valuation

[Article](#) - \$8.32 million was liquidated for 0 DAI

Frax

From Frax [documentation](#)

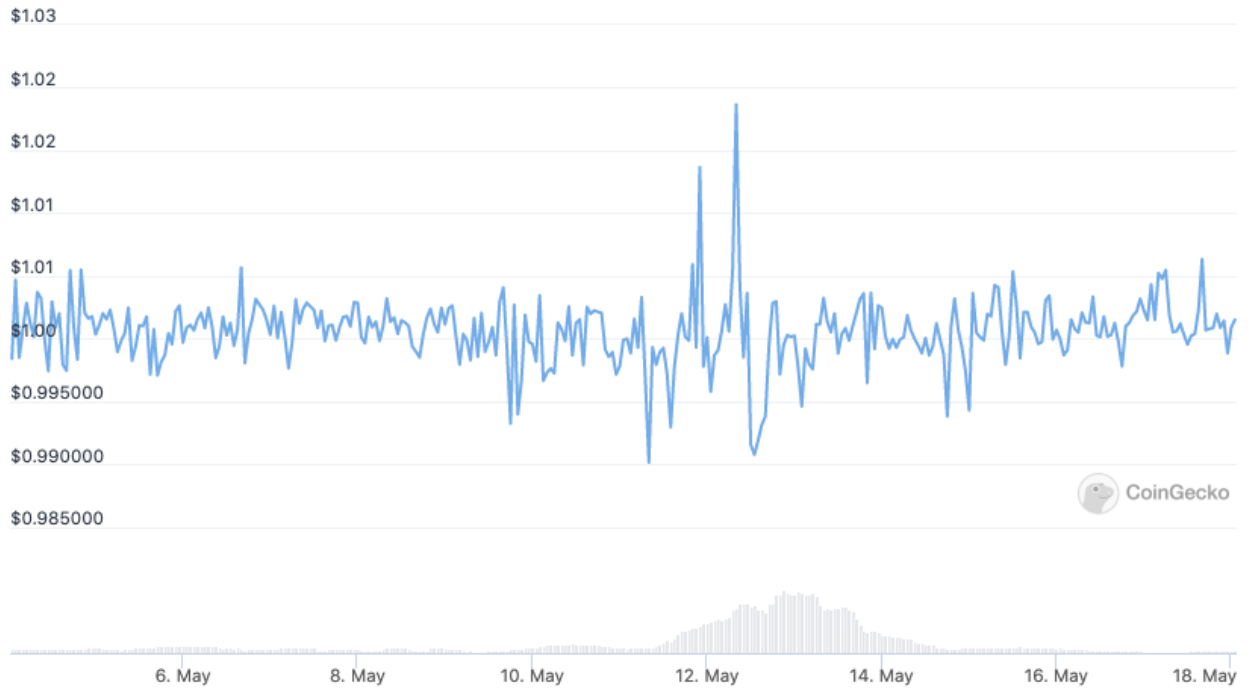
Frax is the first fractional-algorithmic stablecoin protocol. Frax is open-source, permissionless, and entirely on-chain – currently implemented on Ethereum and 12 other chains. The end goal of the Frax protocol is to provide a highly scalable, decentralized, algorithmic money in place of fixed-supply digital assets like BTC. The Frax ecosystem has 2 stablecoins: FRAX (pegged to the US dollar) & FPI (pegged to the Consumer Price Index).

Frax is a new paradigm in stablecoin design. It brings together familiar concepts into a never before seen protocol:

- **Fractional-Algorithmic** – Frax is the first and only stablecoin with parts of its supply backed by collateral and parts of the supply algorithmic. This means FRAX is the first stablecoin to have part of its supply floating/unbacked. The stablecoin (FRAX) is named after the "fractional-algorithmic" stability mechanism. The ratio of collateralized and algorithmic depends on the market's pricing of the FRAX stablecoin. If FRAX is trading at above \$1, the protocol decreases the collateral ratio. If FRAX is trading at under \$1, the protocol increases the collateral ratio.
- **Decentralized & Governance-minimized** – Community governed and emphasizing a highly autonomous, algorithmic approach with no active management.
- **Fully on-chain oracles** – Frax v1 uses Uniswap (ETH, USDT, USDC time-weighted average prices) and Chainlink (USD price) oracles.
- **Two Tokens** – FRAX is the stablecoin targeting a tight band around \$1/coin. Frax Shares (FXS) is the governance token which accrues fees, seigniorage revenue, and excess collateral value.
- **Crypto Native CPI** – Frax's end vision is to build the first crypto native version of the CPI called the Frax Price Index (FPI) governed by FXS holders (and other protocol tokens). FRAX is currently pegged to USD but aspires to become the first decentralized, permissionless native unit of account which holds standard of living stable.

Price History from CoinGecko

May 4, 2022 → May 18, 2022



Float

Unlike most stablecoins, whilst FLOAT is designed to be stable and have significantly lower volatility than most cryptocurrencies, **it is not designed to hold its price at \$1.00**. Instead, **it is designed to float and change value over time**.

FLOAT is stabilised through frequent auctions to expand or contract the supply. It is also partly supported by a Basket of cryptocurrencies that are used as part of the auction process.

FLOAT is also supported by a second token, BANK .

This token serves three purposes:

- to take the profit created in times of excess demand for FLOAT,
 - to support the price of FLOAT from time to time and
 - to govern the Float protocol.
-

Iron

From Rekt :

On Binance Smart Chain, IRON uses BUSD and their native token STEEL as collateral to maintain a peg at \$1.

On Polygon, IRON used USDC and their native token TITAN to maintain the peg.

The incident started when TITAN became overpriced, perhaps due to users purchasing the token in order to farm TITAN pairs at ~50,000% APY.

Some large TITAN sales were made and the price became volatile, making investors nervous, and leading them to also sell their tokens.

The IRON stablecoin then lost its peg due to TITAN dropping so rapidly.

This created a situation in which users could now redeem a token worth 90 cents, for 75 cents of stablecoin and 25 cents of TITAN. An incredible arbitrage opportunity which required minting new TITAN tokens each time.

The market was flooded with freshly minted TITAN, and a panic sale began, pushing down the TITAN price and therefore making the IRON stablecoin lose its peg even further.

Gyroscope Protocol

Gyroscope's mission is to build robust public infrastructure for DeFi. The central piece is a fully-backed stablecoin with all-weather reserves and algorithmic price bounding:

- **A fully backed stablecoin:** the Gyroscope stablecoin aims at a long-term reserve ratio of 100%, where every unit of stablecoin is backed by 1 USD worth of collateral.
- **An all-weather reserve:** the reserve is a basket of protocol-controlled assets that jointly collateralize the issued stablecoin. Initially most assets will be other stablecoins. The reserve aims to diversify all risks in DeFi to the greatest extent possible. It considers more than just price risk, but also censorship, regulatory, counterparty, oracle and governance risks.
- **Algorithmic price bounding:** Prices for minting and redeeming stablecoins are set algorithmically to balance the goal of maintaining a tight peg with the goal of long-term viability of the project in the face of short-term crises.



Further Resources

[Video](#) from Arian Klags-Mundt

[Stablecoins 2.0: Economic Foundations and Risk-based Models](#) from Cornell