BINANCE RESEARCH

Algorithmic Stablecoins

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Key Takeaways

- Stablecoins aim to bring together characteristics of crypto native coins including censorship-resistant digital transactions and the price stability of traditional financial assets such as the US dollar, oftentimes by pegging their value to an underlying asset

- Stablecoins are non-speculative in nature and oftentimes also more centralized than their more volatile counterparts. Presently, centralized stablecoins like Tether, BUSD, and USDC are still dominating the market

- Algorithmic stablecoins try to maintain their peg by controlling circulating supply. In an ideal situation, price and supply move simultaneously, allowing the price to stay stable

- Due to their nature, algorithmic stablecoins come with a base level of underlying fragility

- So far, over-collateralization, meaning collateralized with more than 100%, has proven to be one of the best risk-mitigating factors when it comes to algorithmic stablecoins

- Stablecoins are often considered the most viable tool for crypto mass-adoption, integrating real-world payments and applications with the cryptocurrency space

Introduction

In 1944 the Bretton Woods Agreement was negotiated by 44 countries. Under the agreed Bretton Woods System, gold would be used as the underlying foundation for the US dollar's value, with other currencies being pegged to the US dollar. The goal of this agreement was to create a working foreign exchange system in which competitive devaluations between countries would be prevented.

Implemented in 1958, the Bretton Woods Agreement came to an early end on August 15, 1971. Following periods of high military spending, President Richard M. Nixon's announcement that the US would no longer exchange gold for US dollars concerned that the US gold supply would no longer be sufficient to cover the number of US dollars in circulation.[1]

By 1973, the Bretton Woods System had completely collapsed, and the G–10 approved an arrangement wherein six members of the European Community tied their currencies together and jointly floated against the U.S. dollar instead. At this point in history, countries were free to choose any exchange arrangement for their currency. For example, they could link their currency to another country's currency or simply let it float freely and let the market decide the appropriate price.[2]

In October of 2008, Bitcoin was first introduced. The idea was to create a decentralized digital currency that does not need a central bank. It wasn't until 2014 that the first stablecoins were issued. Back then, the initial backing happened through other cryptocurrencies instead of fiat money, but they laid the foundation for what was about to come. Similar to the development during the 70s, the full-collateralization of stablecoins and fiat backing of such was questioned. Thus, we saw the development of so-called algorithmic stablecoins, introduced in the same year (2014) by Robert Sams in his paper "A Note on Cryptocurrency Stabilization: Seigniorage Shares."

What are Stablecoins

Stablecoins are digital currencies that aim to achieve a high level of price stability, oftentimes by pegging their value to a fiat currency at a fixed exchange rate. The most common currency used is the US dollar (USD). Stablecoins aim to bring together characteristics of crypto native coins, including censorship-resistant digital transactions and the price stability of traditional financial assets such as the US dollar or gold.

Most stablecoins circulate on public blockchains, such as Ethereum. The majority of these stablecoins are backed by cash or cash-equivalent reserves such as bank deposits, Treasury bills, and commercial paper. These reserve-backed stablecoins are also referred to as custodial stablecoins, as they are issued by intermediaries who serve as custodians of cash-equivalent assets.[3]

As mentioned above, stablecoins aim to minimize price volatility in order to negate the volatility of most cryptocurrencies and help to create an overall more consistent and reliable market environment, fostering the adoption of digital assets. However, to date, there does not exist a uniform definition of stablecoins.

There are essentially four different types of stablecoins. **Stablecoins can be either centralized or decentralized and be over- or under-collateralized.** In this report, we will be focusing on algorithmic stablecoins, which are oftentimes decentralized and under-collateralized, though they don't always need to be. Their key characteristic is smart contracts that automatically defend the peg by buying or selling the stablecoin.[4] To understand the difference between stablecoins better, we should talk about the difference between centralized and decentralized stablecoins and look at the different types of collateralization.

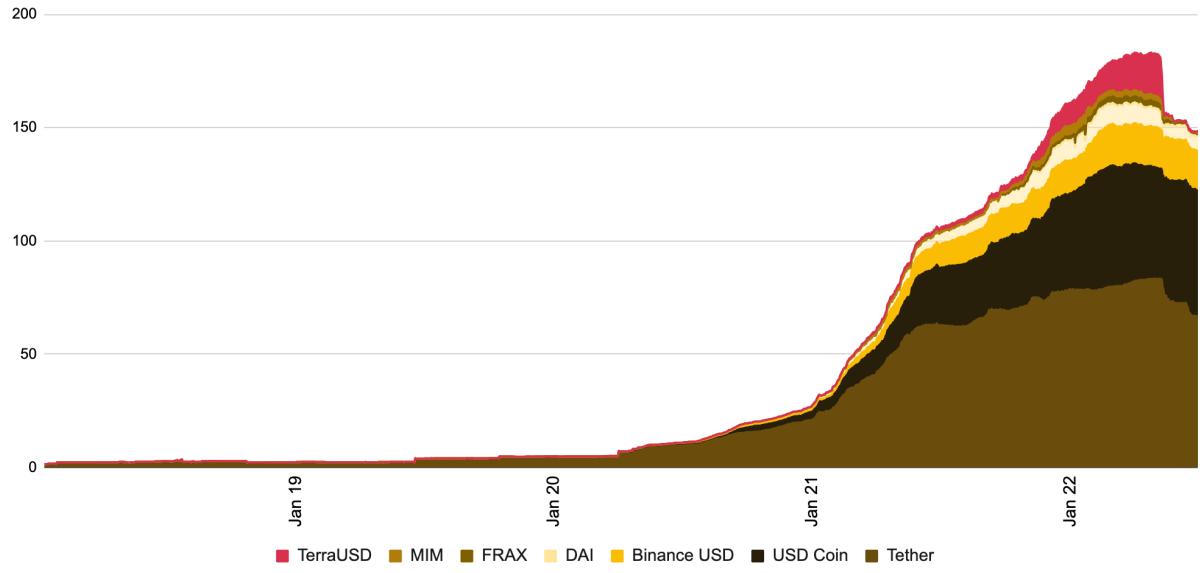
Table 1 - Stablecoin Classification

	Centralized	Decentralized
Over-collateralized	BUSD, USDC	DAI, MIM
Fully-collateralized	USDT	
Under-collateralized	-	UST

1) Centralized Stablecoins

The current landscape is strongly tilted towards "off-chain" custodial (centralized) stablecoins like Binance's BUSD, which is fully collateralized, holding fiat currency and other high-quality liquid assets to guarantee a stable 1:1 peg with the US dollar. Similar to that, Tether, the biggest stablecoin by market capitalization, offers a centralized stablecoin collateralized with a majority of their holdings in Cash, Cash equivalents, or commercial paper. However, unlike BUSD, which has been gaining substantial market share in the last few years (Graph 2), these high-quality assets only make up around 85.64% of Tether's backing. The remaining 14.36% is either in investments, secured loans, or corporate loans and funds (As of March 2022)[5]. **It is important to understand that stablecoins are non-speculative in nature and oftentimes also more centralized than their more volatile counterparts.** If built on permissioned blockchains, the creator of the stablecoin has full control over its node operators and allowed participants. Centralized stablecoins make up more than 90% of the current 160bn USD stablecoin landscape (Graph 1). They played an important role in the overall stablecoin growth so far. However, the fact that they are controlled by a centralized agency is a thorn in the eye of many, and their 1:1 backing with fiat assets limits scalability.

Graph 1 - Stablecoin Market Capitalization (bn, USD)

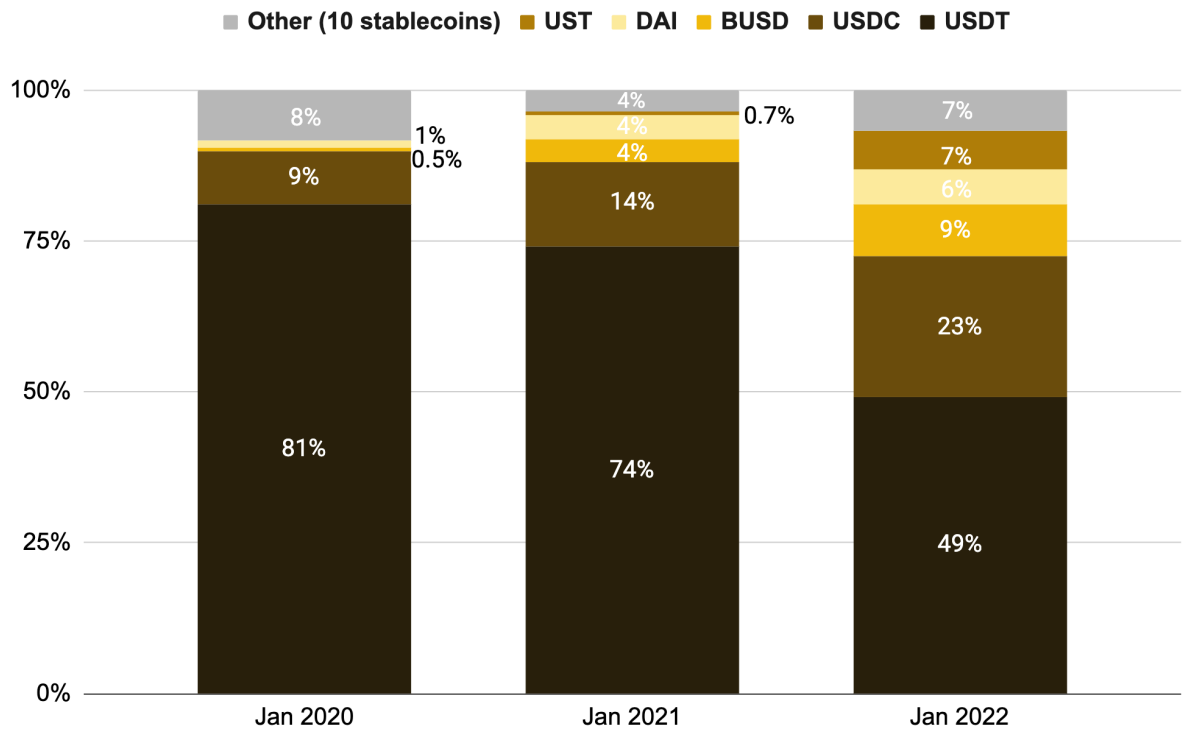


Source: CoinMarketCap[6]

2) Decentralized Stablecoins

In contrast to centralized stablecoins, there are also decentralized ones. A prominent example of this is MakerDAO's DAI token. DAI is a decentralized stablecoin, over-collateralized with crypto assets, meaning that 100% of the value of the stablecoin is held "on-chain" and that the overall collateral surpasses 100%. It is possible that decentralized stablecoins are not-collateralized at all and use other mechanisms to maintain their peg.[7] **Decentralized stablecoins are important building blocks for future growth in DeFi and other areas as they are less exposed to regulation and go hand-in-hand with the ethos of crypto, offering a permissionless and decentralized alternative to regulated assets.** Crypto-backed and pure-algorithmic stablecoins achieve decentralization through DAO governance. Thus, (monetary) policies implemented by these protocols are voted on by share token holders in a transparent way. The lack of collateral backing makes purely algorithmic stablecoins the most permissionless form of money. **Most algorithmic stablecoins fall into this category, being either over-collateralized or relying purely on coded monetary policy.** Over the last few years, decentralized stablecoins have gained substantial market share (Graph 2).

Graph 2 - Stablecoin Market Share (%)



Source: CoinMarketCap, Binance Research[8]

3) Types of Collateral

There are essentially three types of possible collateral that a stablecoin can have (Table 2). The most common stablecoins are fiat-collateralized. They are backed by real-world assets such as fiat currencies (a single currency or a basket of such) or commodities such as gold and silver. **Fully collateralized stablecoins are highly regulated and require external audits.** The most common ones include BUSD and USDC, which are all fully fiat-collateralized and Digix Gold (DGD) which is backed by real-world commodities.

On the other hand, crypto-collateralized stablecoins are backed by other cryptocurrencies, such as Bitcoin or Ethereum. Currently, the most common crypto-collateralized stablecoin is MakerDao's DAI which is why we will have a more detailed look at it in later parts of this report.

The third classification of stablecoins covers "non-collateralized" stablecoins. These stablecoins do not get their value through fiat or crypto collateral but instead depend on a combination of algorithms that aim to create price stability by manipulating the circulating supply.

Table 2 - Stablecoin Landscape

Fiat-backed	Ticker	Market Cap (USD, bn)	Launch
Tether	USDT	75.6	2014
Circle	USDC	52.1	2018
Binance	BUSD	18.0	2019
True USD	TUSD	1.2	2018
Paxos	USDP	1.0	2018
Huobi	HUSD	0.4	2018
Gemini	GUSD	0.2	2018

Crypto-backed	Ticker	Market Cap (USD, bn)	Launch
MakerDAO	DAI	6.5	2017
Abracadabra	MIM	1.9	2021
Liquity	LUSD	0.7	2021
Synthetix	sUSD	0.1	2018

Pure Algorithmic	Ticker	Market Cap (USD, bn)	Launch
Frax	FRAX	1.5	2020
TerraUSD	UST	1.4	2020
Neutrino	USDN	0.9	2019
Fei Protocol	FEI	0.4	2020
TRON DAO	USDD	0.3	2022

Source: CoinMarketCap[9]

Algorithmic Stablecoins

The concept of Algorithmic Stablecoins is not new and was already introduced in 2014 by Robert Sams. **The algorithm element of these stablecoins is a set of predefined rules in the protocol that adjust the supply level based on the deviation between the market price and the target price without human intervention.** In his paper, Sams argues that an elastic supply rule is needed to adjust the quantity of coin supply proportionally to changes in the coin market value.[(10)]

Algorithmic stablecoins can be both collateralized and non-collateralized, making the algorithmic stablecoin space difficult to categorize. **Broadly speaking, we can classify algorithmic stablecoins into three categories: Rebase, seigniorage, and fractional-algorithmic.** Rebase algorithmic stablecoins manipulate the base supply to maintain the peg. Seigniorage algorithmic stablecoins use a multi-coin system, wherein one coin's price is designed to be stable, and at least one other coin is designed to facilitate that stability. Fractional-algorithmic stablecoins are part seigniorage, part collateralized. The algorithmic peg mechanism is a crucial foundation for all of them.

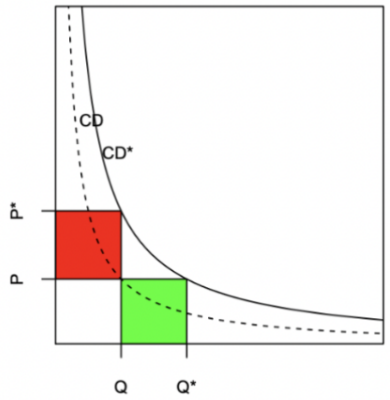
Algorithmic peg mechanism

Coming back to Sams' paper, we can see that an elastic supply rule makes sense if you think about the general behavior of cryptocurrencies. If we have a deterministic coin supply, we can observe that a higher demand translates into a higher price while a lower demand translates into a lower price of the underlying cryptocurrency, thus making price volatility proportional to the demand volatility. Similar to equity markets, we can observe that also in crypto markets, expectations about the future can drive up the current price if expectations are such that the long-term rate of adoption is higher than the rate of supply. However, with uncertainty around future adoption, we see high levels of volatility.

The most common solution to coin distribution includes the creation of two separate coins. One that acts like "money" and another that serves as "shares" (often called balancer and traded on secondary DeFi exchanges) in a seigniorage system. While the first coin has the upfront objective of stabilization, the second coin needs to be seen as a pair. For example, when the stablecoin supply increases, stablecoins are distributed to holders of the balancer coins (which are destroyed in the process). When supply needs to decrease, we reverse the process, and the balancer-coin is distributed to coin holders in exchange for their stablecoin. In

essence, we have two scenarios. When demand for a stablecoin increases, the price of that stablecoin should increase above 1 US dollar, and thus the supply of stablecoins must increase. The new supply of the stablecoin will be distributed to shareholders until the demand is matched at an equilibrium price. If the price falls, the opposite happens, and we see stablecoin supply being removed from circulation. This way, a coin price (representing a change in demand) will lead to a subsequent change in coin supply. **In an ideal situation, price and supply move simultaneously, allowing the price to stay stable** (represented by the green box in Graph 3).

Graph 3 - Stabilization of price and supply



Source: Robert Sams[11]

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In the existing model, **Seigniorage shares are only worth something if buyers believe in the ongoing viability of the system.** Without any collateral backstop to offset a downward spiral, algorithmic stablecoins would need outside lenders to bail them out during periods of severe contractions. This is why more and more algorithmic stablecoins build crypto-collateral, thus creating a new sub-class of algorithmic stablecoins.

> “If a protocol doesn’t reach a sufficient level of market capitalization with enough liquidity, fluctuations in demand could cause volatility”

Another challenge that algorithmic stablecoins have to overcome is that of bootstrapping. This is important because **if a protocol doesn’t reach a sufficient level of market capitalization with enough liquidity, fluctuations in demand could cause significant volatility.** In order to

create that demand, protocols try to gain early investors through incentives such as a high annual percentage yield (APY) on the stablecoin.

Development and History of Algorithmic Stablecoins

We touched on the initial idea of algorithmic stablecoins a bit already, but let's explore the history and development of them more and see what has happened since 2014.

BitUSD and NuBits, the first official stablecoins, were issued in 2014 and were initially collateralized through cryptocurrencies instead of fiat. BitUSD, the brainchild of Dan Larimer and Charles Hoskinson, was issued on the BitShares blockchain and backed by BitShares core token BTS. BitUSDs success came to an end in 2018 when it lost parity to the US dollar. Due to a flawed stability mechanism that only protected against falling BitShares value but not against a falling value in BitUSD, the stablecoin was not able to keep its peg on November 25, 2018. On that day, BitUSD triggered an emergency "global settlement" due to under-collateralization by BitShares. Due to the only psychological 1 USD peg and the newly introduced inability to borrow BitUSD, the price of BitUSD collapsed. **Once the trust in the stablecoin was lost, it never recovered from this event.**[(12)]

NuBits was released just a few months after BitShares and was the first to implement the seigniorage system proposed by Robert Sams. NuBits lost its peg twice and offered valuable lessons for future stablecoin projects. The first time the NuBits peg broke was in 2016. This initial failure was most likely due to high selling pressure as it correlated with Bitcoin spiking and people buying more volatile assets. The second time the NuBits peg broke was in March 2018. This time around, NuBits crashed due to insufficient reserves. After a small demand dip, the team behind NuBits was unable to protect the peg due to missing reserves, and once the market noticed it the stablecoin was in a downward spiral from which it never recovered.[(13)]

"Once the trust in the stablecoin was lost, it never recovered from this event"

Other projects like Basis ended before they could even launch. In 2018 Basis was probably the most well-funded stablecoin project, but it ended due to regulatory headwinds. The Security Exchange Commission (SEC) deemed the offer unregistered security because the stabilization mechanism relied on "bond" and "share" tokens to adjust total supply. Being a security would mean enforcing transfer restrictions which in return would require a centralized whitelist, meaning the system would not only lose its censorship resistance but also that on-chain auctions would have significantly less liquidity. While never launched, Basis laid an important foundation for future algorithmic stablecoins, and future projects like Basis Cash, with a similar design, helped to spur the algorithmic stablecoin wave at the end of 2020.

Another algorithmic stablecoin project we should touch on is Iron Finance. Lacking a proper stabilization mechanism, IRON, the stablecoin of Iron Finance, moved off-peg following a devastating crash of Iron Finance's governance token TITAN. It all started when the TITAN token became overpriced due to strong demand for the token due to high farming incentives. After some large token sales, the price started to become more volatile, and nervous investors started selling additional TITAN tokens. This led to increased arbitrage but also more newly minted TITAN causing the token to lose value and subsequently causing IRON to lose its peg. In a postmortem, the team failed to mention the lack of stabilizing mechanisms, and a bank run resulted in Iron Finance losing almost all of its 2bn USD total value locked (TVL).[14]

Frax Protocol was probably the first one to implement a so-called fractional reserve model in which stablecoins try to find a sweet spot between over-collateralized and pure algorithmic in order to allow for scalability, capital efficiency and a decentralized stable value. The underlying reserves allow for more stability in times of contraction, providing confidence in the peg compared to non-collateralized algorithmic models.

Thus far, **most algorithmic stablecoin projects have not worked, and similar to electric cars in the early 2000s, the world might not be ready for them yet.** However, the underlying concept is important for future growth in the crypto space, and it is more than likely that we will see further attempts at building an algorithmic stablecoin that can prove its resilience. To understand algorithmic stablecoins better, we should look at a few prominent examples in more detail.

Algorithmic Stablecoin Landscape

Presently, centralized stablecoins like Tether are still dominating despite criticism around their reserves. Tether has remained the top stablecoin in terms of both market capitalization and trading volume since its launch in 2015. As of now, the overall stablecoin market is dominated by the top 4 stablecoins. However, we see how decentralized and crypto-backed stablecoins are continuing their growth journey, and more and more venture capitalists support non-collateralized algorithmic stablecoins despite earlier failures.

1) Decentralized & Over-collateralized

❖ DAI[15]

Launched in December 2017, MakerDao's DAI stablecoin is an Ethereum-based, fully decentralized, and USD-pegged cryptocurrency. While being pegged against the US dollar, it does so through an algorithmic element and over-collateralization through other cryptocurrencies. Currently, DAI is collateralized by a combination of Ethereum and USDC, BTC, and other cryptocurrencies. The ETH-A and ETH-C pools make up a total of 37.1%, while the biggest USDC pool makes up 29%. Looking at DAI generated by its collateral, we can see that more than 48% of DAI is generated through USDC collateral, while only around 17% is generated through Ethereum collateral.[16] Ethereum is placed in pools used as collateral for the issuance of the DAI token. MakerDAO's DAI is an example of Protocol Controlled Value (PCV), which represents all assets that are ultimately not redeemable by users.

The DAI stablecoin uses smart contracts that respond to varying market dynamics in order to keep its peg. MakerDAO uses a governance token (MKR) to not only govern the system but also to serve as last-resort collateral in case of crashes in the Ethereum price. MakerDAO does so by issuing and selling new MKR tokens. Maker backs and stabilizes the value of DAI through a dynamic system of Collateralized Debt Positions (CDPs), autonomous feedback mechanisms, and appropriately incentivized external actors. **Considering the programmatic mint-and-burn mechanism, we can classify DAI as an algorithmic stablecoin, though different in nature from earlier stablecoins due to their over-collateralization.**

The primary stability mechanism used by MakerDAO is the ability to redeem DAI for 1 USD worth of Ethereum. If the price of DAI falls, CDP owners need to either use their DAI holdings or buy it in the market, allowing them to redeem DAI for 1 USD worth of Ethereum based on the

price feed provided by oracles. If the value of the collateral falls to an insufficient level to back up DAI, traders can redeem Ethereum collateral held by another CDP. The current collateralization rate is at around 150% of the value of DAI. This mechanism aims to ensure that there is always sufficient liquidity and collateral. It can be thought of as a building block of the stability mechanism, which aims to ensure that the level of collateral is sufficient. MakerDAO token holders act as the buyer of last resort. If the collateral in the system were to drop below 100% collateralization, MakerDAO is automatically created and auctioned on the open market to raise additional funds to collateralize the system. Hence, if the system becomes under-collateralized, Maker holders absorb the damage. This mechanism protects the value of collateral but does not directly help the price of DAI to converge to 1 USD. Effectively, **DAI's primary stability mechanism is the ability of CDP owners to redeem if the price of DAI is too low and for people to create new DAI if the price is too high.** In detail, if the price of DAI falls below 1 USD, CDP owners could purchase DAI in the market and redeem it, receiving 1 USD worth of Ethereum and making a profit.

In conclusion, we can observe that the DAI stability mechanism relies on a complex combination of different factors, which, to some extent, work in a circular fashion. **While still reliant on investor expectations and market psychology, we can see that DAI is more resilient than non-collateralized algorithmic stablecoins. Collateral can give users greater confidence in the overall price stability.** As such, over-collateralization mechanisms protect the price of the system, thus proving more resilience compared to uncollateralized projects. DAI is still at risk of failing in periods of market turmoil, and newer protocols are aiming to build on increased resilience.

2) Decentralized & Under-collateralized

❖ UST[17]

Perhaps the most talked-about algorithmic stablecoin platform right now is Terra. The creator of the Terra platform, Terraform Labs, created algorithmic stablecoins pegged to USD, EUR, CNY, JPY, GBP, KRW and other currencies, though their main algorithmic stablecoin peg is with the US dollar (known as TerraUSD or UST). Terra minted US dollar-pegged algorithmic stablecoin, using a governance balancing token known as LUNA. The goal was to create a price-stable and growth-driven algorithmic stablecoin. The price stability element was created via an elastic money supply through stable mining incentives. Like most algorithmic stablecoins, it also used a seigniorage system created by its minting operations to stimulate transactions. Since the price of Terra currencies in secondary markets is exogenous to the

blockchain, the system relied on a decentralized price oracle to estimate the true exchange rate.

In order to obtain stability, Terraform Labs created a system in which miners bear the costs of UST volatility in the short term while being compensated for it in the long term. Due to the fact that the protocol ran on a Proof of Stake (PoS) blockchain, miners needed to stake LUNA to mine UST transactions. Consequently, LUNA represented the mining power in the network. Furthermore, LUNA also served as the most immediate defense against price fluctuations and volatility. The system used LUNA to set the price for UST by agreeing to be a counterparty to anyone looking to swap UST and LUNA at Terra's target exchange rate. Due to arbitrage opportunities, the price of Terra's UST should have remained close to its peg while LUNA is absorbing market volatility.

In contrast to DAI, Terra aimed to create an L1 ecosystem built on top of their algorithmic stablecoin. This includes synthesized assets that track stocks and futures, a lending and saving platform, and other applications built within the Terra ecosystem. Given their many applications within the Terra ecosystem, these algorithmic stablecoins also directly impact the economic prospects of a number of businesses and consumers. **In order for this ecosystem to be continually viable, there must be a perpetual baseline level of demand in the Terra stablecoins and also the governance token, LUNA.** The founders of Terra hoped that mainstream adoption of their stablecoins as transactional currencies, and the ability to "stake" them and earn rewards, would create "network effects" and long-term incentives to hold and maintain the ecosystem. The fact that they couldn't take the entire market by surprise.

> "The most recent bank-run on UST has proven that it is hard to maintain a perpetual demand even with network economics in place"

To understand the importance of the network idea a bit better, we can have a look at Anchor protocol, which was the main growth engine behind the adoption of UST. The smart contract lending and borrowing platform drove more than ⅔ of the demand for UST, making it a crucial backbone to the ecosystem. By depositing UST tokens, investors could access an APY of up to 20%. This way, they become lenders, providing the Anchor protocol with its liquidity for borrowers. In turn, borrowers have to provide collateral against the loan. Staking rewards on bonded assets are liquidated into UST with its liquid-staking protocol. With a high LUNA staking yield and a high borrowing limit, the double-digit Anchor APY became a key building block for the Terra network, though it relied on a consistent demand to borrow.[18] **The most recent bank**

run on UST has proven that it is hard to maintain a perpetual demand even with network economics in place. After the UST de-pegging, the protocol tried to regain the peg by minting more LUNA and absorbing excess UST supply. Ultimately, the LUNA token fell more than 99.9% from its all-time high.

❖ USDD[19]

Tron network, specifically the TRON DAO, announced the release of its own algorithmic stablecoin USDD in April 2022. Similar to Terra, the Tron network specializes in stablecoin payments, having processed over $4 trillion in USDT transactions. **USDD represents the third generation of stablecoins, as fully on-chain without any centralized institutions.** The USDD protocol is pegged to the US dollar.

USDD is utilizing a built-in incentive mechanism and a responsive monetary policy, which aims to help USDD to self-stabilize against price fluctuations. **As a decentralized currency protocol with a stable price, USDD aims to expand use cases for cryptocurrency, similar to other decentralized algorithmic stablecoins.**

Looking at USDD's stability mechanism, they aim to resolve short-term price fluctuations and cyclical price risks with responsive monetary policy and a mintage mechanism similar to UST. In the USDD protocol, TRON's Super Representatives absorb the volatility of the USDD price, bearing the cost in the short term, but being rewarded long-term. When the USDD price falls below the target, users will burn their USDD to mint TRON token (TRX), which brings the USDD price back to the target level. The minting of the TRON token will temporarily dilute the TRON token mining power of the Super Representatives. In the medium to long term, Super Representatives are compensated with fee rewards incurred from token swaps by the USDD protocol. The Super Representatives (SRs) on TRON play a key role in guaranteeing the security and stability of the USDD protocol. Specifically, they safeguard the TRON network by participating in the Delegated Proof of Stake (DPoS) consensus mechanism and provide stability for USDD by absorbing short-term price volatility.

Similar to Terra's UST, TRON's USDD helps to foster further adoption of algorithmic stablecoins, using similar concepts. However, **similar to UST it comes with the same risks and weaknesses and relies on constant demand.** Thus, without over-collateralization, the overall resilience of the stablecoin can be questioned.

❖ USN[20]

USN is a NEAR-native stablecoin soft-pegged to the US Dollar, backed by a Reserve Fund that contains NEAR tokens, as well as an initial backing of 1 billion USDT. The stability mechanisms utilized by USN consist of on-chain arbitrage and the Reserve Fund. USN's smart contracts and Reserve Fund are managed by the Decentral Bank DAO.

Mirroring Terra's UST, USN doesn't have cash reserves but relies on NEAR tokens as a collateral, boosted with USDT in the initial stage. Just like UST and USDD, USN will generate yield based on NEAR token staking rewards. However, unlike the case of UST where you burn LUNA to mint UST, USN is minted in a "swap" process with NEAR. The NEAR used to mint USN is then staked on the NEAR blockchain to generate staking rewards, which get distributed to USN holders. **The key is that minting/burning USN does not change NEAR's supply. This means the baseline economic security of the NEAR blockchain is improved by the Reserve Fund's distributed staking.**

The protocol is aiming that USN, the stablecoin itself, will not fundamentally affect NEAR's security, as burning USN does not increase the circulating supply of NEAR. As such, NEAR's USN represents another approach in the race towards higher adoption of a decentralized algorithmic stablecoin landscape.

❖ USDN[21]

Neutrino USD, also known as USDN, is an algorithmic USD-pegged stablecoin created with the Neutrino protocol in 2019. USDN is collateralized by the native WAVES token.

USDN, an algorithmic stablecoin of the Waves ecosystem, lost its US dollar peg twice so far. The first de-peg happened after the WAVES token, the token backing the dollar-pegged cryptocurrency, saw a double-digit price decline. Interestingly, this happened despite the claims of over-collateralization and a backing ratio of 2.62 as of April 4, 2022. So despite having enough funds, the sell-off de-pegged the stablecoin.[22]

This again is underscoring the inherent risks that come with algorithmic stablecoins, which is why we should explore some of the risks in a bit more detail at this point.

Risks

When talking about algorithmic stablecoins, it is important to talk about the underlying risks that come with the oftentimes under-collateralization of these tokens. Generally speaking, under-collateralized stablecoins will always be more fragile than over-collateralized stablecoins, no matter if centralized or decentralized. As such, even fiat-backed stablecoins bear higher levels of risk if they are not fully backed by cash or cash-equivalents, as is the case for Tether.

As of now, almost all algorithmic stablecoins have failed, and more developments are needed in this space before the world might be ready for them. **Next to the common risks in crypto, there are additional risks we should take into consideration when talking about stablecoins.**

While history has shown that algorithmic stablecoins have inherent fragility, we have seen innovation in the space and iterations that have proven to hold their peg. However, a base level of vulnerability exists because it is outside the control of the protocol.

- **Algorithmic stablecoins require a constant demand support level to ensure continuous operability.** If demand falls below a threshold level, it can happen that an algorithmic stablecoin enters a death spiral that will ultimately cause the project to fail.

- **Participants in price-stabilizing arbitrage need to be independent.** This, however, is impossible to guarantee due to the lack of legal obligations to perform necessary price-stabilizing arbitrage.

- **A constant level of information symmetry is needed.** Information asymmetry could cause the forming of herds and cascades, which could lead to strong price movements that could ultimately cause an algorithmic stablecoin to fall below its threshold level.

Many stablecoins continue to offer claims on underlying assets without having any government guarantee or proof of such on the blockchain. Consequently, trust is mainly generated privately by backing coin issuance with safe and liquid assets.[23] For stablecoins, especially for algorithmic ones, there is an inherent risk that once a peg is broken for a longer period of time, that trust is harmed and that the stablecoin will eventually go to 0.

Only if the three mentioned conditions are met can we assume algorithmic stablecoins to be less fragile. **Due to the exogenous nature of these factors, it seems impossible to guarantee**

that they will always be met, though. Especially during crises and periods of high volatility like 2018, 2020, and 2022 history has proven that we cannot assume these factors to be certain.[24] **So far, over-collateralization has proven to be the best risk-mitigating factor when it comes to algorithmic stablecoins.**

Opportunities

At the end of the day, the risks also come with great opportunities and continuous innovation in the space is leading a path towards a future away from fiat money. **The benefits of stablecoins are obvious. They help to integrate day-to-day life into the digital space and offer a simple user-centric design that allows for more efficient financial market operations.** Due to the low volatility of the tokens, the use-cases of stablecoins can overlap the use-cases of the US dollar and other major currencies making them the most viable tool for crypto mass-adoption.

1) Payments

Currently, most cryptocurrencies have not been widely used as a means of payment due to their high volatility. With the successful integration of stablecoins, we can see increased efficiency in cases of commercial payments between countries and companies, payments of recurring nature such as salaries, long-term loans and store-of-value instruments, hedging and arbitrage trading. More importantly, **stablecoins are the most important building block when combining real-world payments with the cryptocurrency space.**

> "Stablecoins are the most important building block when combining real-world payments with the cryptocurrency space"

Additionally, **a world with further integration of stablecoins will likely see a higher adoption rate of DeFi and other digital products.** This in return can help unbanked businesses to grow and spur economic growth in emerging markets due to the ability to send and receive money more easily and get access to banking products that would not be possible in a centralized system. It is important to understand that volatility (while being liked by traders) is counter-productive in creating a stable DeFi infrastructure. Stablecoins introduce the

necessary consistency needed to build a functioning DeFi space. **In the long run, due to their importance and central nature, algorithmic stablecoins could play an even more important role for the overall adoption and integration of cryptocurrencies in the legacy financial system than Bitcoin or Ethereum.**

2) Digital Economy

Furthermore, **increased adoption of stablecoins should lead to the continued growth of the Metaverse.** Algorithmic stablecoins have the potential to play an important part in this space, underpinning a move away from legacy financial systems and accelerating the move from the real to a virtual world.

There are clear advantages, such as censorship resistance and high levels of efficiency, once we implement a distributed stablecoin system. While the key focus is still on trading-related activities, such as providing a base pair for liquidity pools, we could already see increased cross-border transactions and in-game adoption.

Outlook

Over the course of the last two years, we have seen more and more Layer 1 platforms launching their own version of algorithmic stablecoins. When talking about it, it is important to understand the current landscape, the history and the nature of algorithmic stablecoins. At the end of the day DeFi, GameFi, the Metaverse and other emerging technologies will need a decentralized stablecoin to grow further and expand into new areas. Due to the nature of fiat-collateralized stablecoins, there will always be an underlying risk of legal seizure of these assets and limited scalability. In order to enable a decentralized ecosystem, a decentralized stablecoin is needed that cannot be controlled or confiscated by governments.

As of now we are already seeing how the landscape is changing faster than most people anticipated. With the recent downfall of TerraUSD and a fear around USDT after a short de-pegging and their under-collateralization of high quality assets, competitors like USDC and BUSD gained market share due to their proven resilience during periods of market volatility. A probably more drastic change is the increased scrutiny from regulators. **More countries are drafting legal frameworks to supervise stablecoins and even more regulation should be expected in the coming years.** However, the search for the holy grail, a fully decentralized algorithmic stablecoin, continues.

Conclusion

Stablecoins have come a long way since they were first introduced in 2014. While centralized and fiat-backed stablecoins are still dominating, we see how crypto-backed stablecoins are continuing their growth journey and more and more algorithmic stablecoins being launched, having learned from past projects. As explained above, there are also inherent risks that come with algorithmic stablecoins.

> “the over-collateralized model has, so far, proven resilience”

Throughout many crypto winters the over-collateralized model has, so far, proven resilience. With increased adoption of crypto and many use-cases for stablecoins there is a lot of room to fill for projects aiming to compete. At this point stablecoins may represent the best approach of connecting payments and other real-world applications with the crypto space. The developments in this area has the potential to lead to more inclusive payment and financial services, growing tokenized financial markets and increased adoption of Web 3.0.

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