



crypto.com

Synthetix

DeFi Project Deep-Dive

May 2020

Research and Insights

DeFi Report



Senior Research Analyst
Kendrick Lau



RESEARCH DISCLAIMER

This report alone must not be taken as the basis for an investment decision. The user assumes the entire risk of any use made of this information. The information is provided merely complementary and does not constitute an offer, solicitation for the purchase or sale of any financial instruments, inducement, promise, guarantee, warranty, or as an official confirmation of any transactions or contract of any kind. The views expressed therein are based solely on information available publicly/internal data/other reliable sources believed to be true. This report includes projections, forecasts and other predictive statements which represent [Crypto.com](https://crypto.com)'s assumptions and expectations in the light of currently available information. These projections and forecasts are based on industry trends, circumstances and factors which involve risks, variables and uncertainties. Opinions expressed therein are our current opinion as of the date appearing on the report only.

No representations or warranties have been made to the recipient as to the accuracy or completeness of the information, statements, opinions or matters (express or implied) arising out of, contained in or derived from this report or any omission from this document. All liability for any loss or damage of whatsoever kind (whether foreseeable or not) which may arise from any person acting on any information and opinions contained in this report or any information which is made available in connection with any further enquiries, notwithstanding any negligence, default or lack of care, is disclaimed.

The reports are not for public distribution. Reproduction or dissemination, directly or indirectly, of research data and reports of [Crypto.com](https://crypto.com) in any form is prohibited except with the written permission of [Crypto.com](https://crypto.com). Persons into whose possession the reports may come are required to observe these restrictions.

Contents

1.	Executive Summary	4
2.	Introduction	5
	2.1 Synthetic Assets	5
	2.2 Synthetix Origins	5
3.	Mechanism	6
	3.1 SNX, Minting Synths, and Exchange	6
	3.2 Pooled Counterparty Model	9
4.	Analysis	13
	4.1 Advantages	14
	4.2 Disadvantages	15
	4.3 Interactions with Other Protocols	18
5.	Summary	19
	5.1 Conclusion	19
	5.2 Statistics	20
6.	References	21

1. Executive Summary

Welcome to our deep dive into DeFi with our report on Synthetix, a decentralized synthetic token issuance and trading platform.

Key Takeaways

- Synthetix is a platform that allows trustless, on-chain issuance and trading of synthetic assets called Synths, which currently include synthetic cryptocurrencies and commodities;
- SNX stakers earn fees and inflationary rewards in exchange for providing the essential function of maintaining sufficient levels of collateral to absorb Synth price fluctuations;
- The protocol's debt pool mechanism can be difficult for new users to understand, which could lead to unintended risks and losses;
- Synthetix Exchange gives users unlimited liquidity and no slippage on trades up to the value of SNX collateral in its systems;
- The SNX token's inflation scheme is well-designed to give active participants a decent incentive to help the system grow;
- Although our view of the protocol is positive in general, there are significant risk factors at play, namely price oracle risk, insolvency risk, and extreme SNX volatility

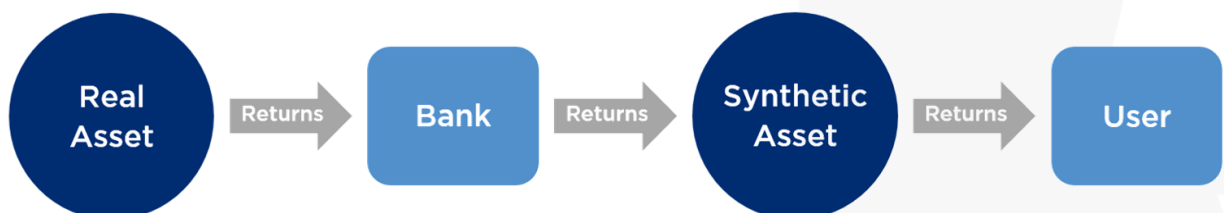
SYNTHETIX

2. Introduction

[Synthetix](#) is an Ethereum-based protocol that allows users to issue and trade synthetic assets. These synthetic assets are tokens backed by SNX collateral that mimic the performance of other assets including cryptocurrencies, commodities, and more. Users are able to freely convert between different kinds of Synths, avoiding the need for counterparties and allowing for massively reduced slippage.

2.1 Synthetic Assets

Synthetic assets, or derivatives, were first developed in the traditional finance industry. There are a number of benefits to trading synthetic assets. Firstly, they can be tailored to suit traders' different requirements, i.e. options or short instruments. More importantly for our report today, synthetics can give access to markets that other traders cannot access. To give an example, banks that have access to restricted stock markets can structure and sell a synthetic asset that mimic holding the physical stock itself, acting as the counterparty.



2.2 Synthetix Origins

Synthetix was originally called Havven, and was conceptualized by founder Kain Warwick in late 2017 as a platform for issuing crypto-collateralized stablecoins, much like [Maker](#). But as the platform gained traction, the team realized that Havven's concepts could be applied to much more than just a stablecoin. Thus, Havven was rebranded to Synthetix and expanded its scope to include crypto-backed synthetic assets.

Synthetix currently offers synthetic cryptocurrencies (BTC, ETH, and more), fiat currencies (USD, EUR, etc.), and commodities (gold, silver). The ultimate goal for Synthetix is to one day offer all types of real-world assets, including stocks, bonds, real estate, and so on.

3. Mechanism

3.1 Actors in Synthetix

We summarize below the three main types of users in Synthetix. In the sections below, we will walk through each of these in more detail.

Actor	Incentive	Contribution
Stakers / Minters	Receive inflationary rewards and transaction fees	Collateralized, pooled counterparty for Synths
Non-Staker Traders	Gain exposure to Synths, trade with no slippage	Transaction fees
External Liquidity Providers	Receive inflationary rewards	Create liquid markets for Synths to reduce slippage during on- and off-ramp

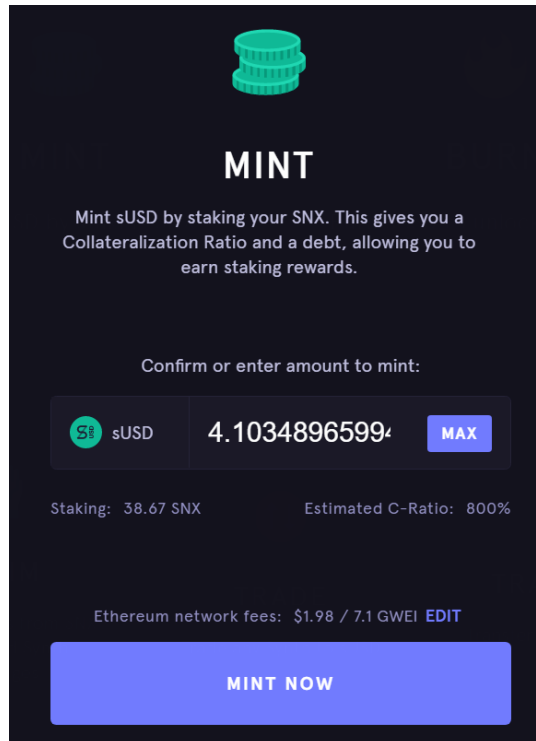
3.2 SNX, Minting Synths, and Exchange

In the Synthetix protocol, synthetic assets are called *Synths*, with each Synth tracking a different asset type, or even offering short exposure to cryptocurrencies.



Staking SNX and Minting Synths

Once users stake SNX as collateral, they are able to mint sUSD, which is pegged to the US dollar. Staking and minting is done on [Mintr](#):

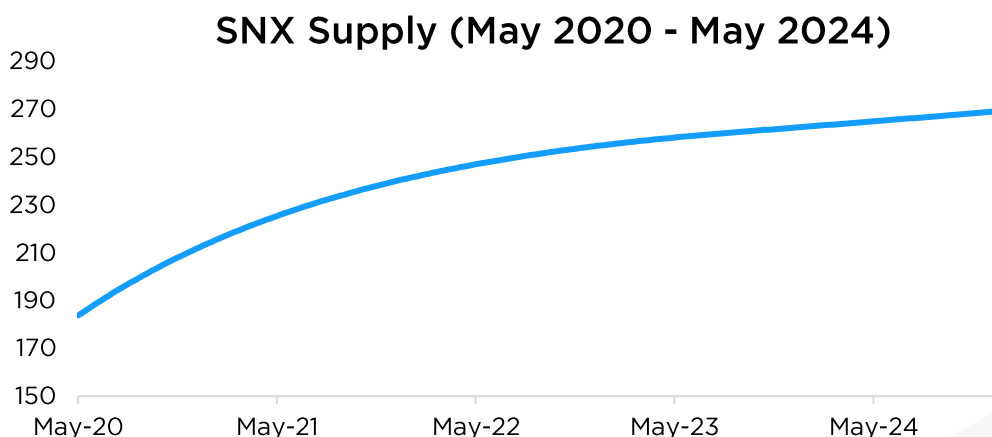


Users are required to fulfill a minimum collateral ratio of 800%. Every sUSD minted must be backed by at least eight times the value of SNX held in Mintr as collateral. This is to ensure that there is sufficient collateral backing all Synths. In essence, SNX stakers incur collateralized debt when minting sUSD, similar to [Maker's](#) debt issuance mechanism (read our report on Maker [here](#)).

Why Stake SNX?

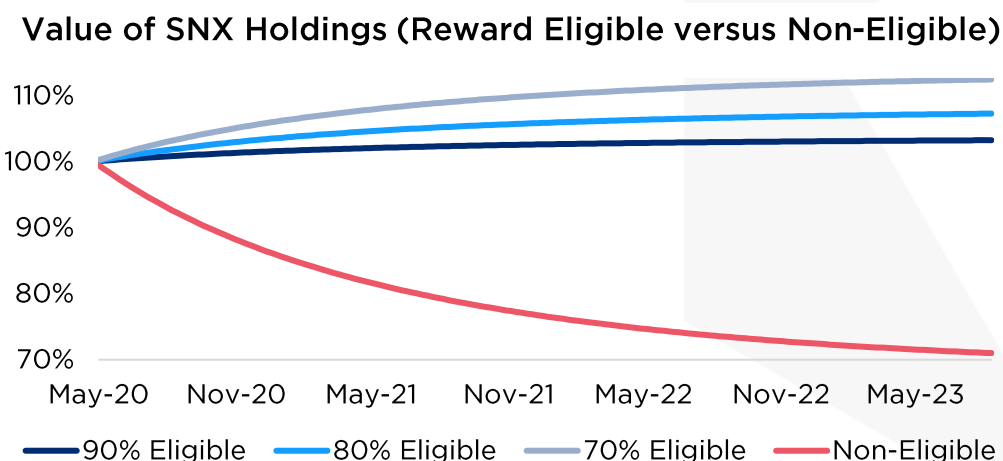
At first glance, it may seem capital inefficient to stake SNX and mint sUSD, so why do it? As it turns out, SNX stakers receive various benefits in return for creating Synths. Firstly, they receive transaction fees generated by traders using the [Synthetix Exchange](#). The transaction fee on each trade is usually 0.3%, which is added to a fee pool to be distributed among SNX stakers.

Another incentive is to receive SNX's inflationary rewards. From May 2020 to August 2023, SNX supply will increase 40% from 184 to 260 million, after which there will be a perpetual 2.5% annual inflation rate. As long as stakers do not fall below the 800% collateral ratio, they will be eligible to claim rewards from the exchange and token inflation.












A quick note on token inflation: why would SNX inflation be a reward when the expected value is theoretically zero, as we found in our [Token Inflation Study](#)?

In short, because only sufficiently collateralized stakers are eligible for rewards. The token inflation and reward policy is essentially an incentive mechanism for users to stake their tokens and maintain a healthy collateral ratio for the system as a whole. Over time, eligible stakers will profit at the expense of non-stakers and under-collateralized stakers, whose SNX holdings will be diluted:



Synthetix Exchange

Once sUSD has been minted, users can exchange sUSD for other types of Synths on [Synthetix Exchange](#). Unlike in other exchanges where there are buyers and a sellers, the mechanism here is very simple. The Synthetix.Exchange smart contract simply burns the sUSD and mints a new Synth in its place, which then changes in value according to price feeds from the price oracle. Synthetix [integrated Chainlink](#) as price oracle in December 2019.

PAIR ↕	LAST PRICE ↕	24HR CHANGE ↕	BUY/SELL	Reverse ↕
 sETH / sUSD	\$204.38	-2.40%	SELL:	Balance: -
 sBTC / sUSD	\$9,295.42	-0.25%	 sUSD	0
 iETH / sUSD	\$155.94	3.33%	BUY:	Balance: -
 sADA / sUSD	\$0.05	-3.47%	 sBTC	0
 sLTC / sUSD	\$45.63	-3.58%	25%	50%
 sEOS / sUSD	\$2.69	-3.65%	75%	100%
 sLINK / sUSD	\$3.61	-3.13%	USD VALUE	\$0
			FEE ?	\$1.72
			GAS PRICE (GWEI)	5.6 EDIT
			CONFIRM TRADE	

3.2 Pooled Counterparty Model

Since Synths are mimicking real assets' returns, any profits made by Synth holders mean losses must be borne by someone. In the case of Synthetix, the counterparty is the entire pool of SNX stakers, who collectively take the other side of the price moves of all Synths.

Pooled Debt

As mentioned before, minting sUSD creates a debt. This debt is then converted into a proportion of all the debt in the system. For example, if you mint 1 sUSD into a debt pool of 100 sUSD, then your debt ratio owed to the network is 1%. The total debt pool is the sUSD value of all Synths outstanding.

To see how this mechanism works in practice, we must explore the entire flow from the perspective of SNX stakers. In the example below, two stakers each mint 50,000 sUSD and Alice buys sBTC, which then appreciates by 50% (Source: [Synthetix Litepaper](#)). The numbers below represent their positions in terms of sUSD and their final net profit:

	Step	Alice	Bob	Debt Pool
1.	Starting sUSD	50,000	50,000	100,000
2.	Debt Pool Percentage	50%	50%	
3.	Alice buys sBTC	50,000 (in sBTC)	50,000 (in sUSD)	100,000
4.	sBTC goes up 50%	75,000	50,000	125,000
5.	Asset Value	75,000	50,000	125,000
6.	Debt Owed	62,500	62,500	125,000
7.	Profit or Loss (Asset minus Debt)	+12,500	-12,500	

If you notice above, even though Alice bought \$50,000 worth of sBTC and sBTC appreciated by 50%, her net profit was only \$12,500, or 25%. This is because Alice and Bob each have half of debt pool as determined when they minted their sUSD. As the total sUSD value of the debt pool increases due to sBTC appreciation, the total debt owed by all stakers also increases.

Notice what happens if Bob also converts his sUSD into sBTC:

	Step	Alice	Bob	Debt Pool
1.	Starting sUSD	50,000	50,000	100,000
2.	Debt Pool Percentage	50%	50%	
3.	Alice and Bob both buy sBTC	50,000 (in sBTC)	50,000 (in sBTC)	100,000
4.	sBTC goes up 50%	75,000	75,000	150,000
5.	Asset Value	75,000	75,000	150,000
6.	Debt Owed	75,500	75,500	125,000
7.	Profit or Loss (Asset minus Debt)	0	0	

Suddenly, neither Alice nor Bob make a profit or loss, despite the increase in value of sBTC. This is because the entire debt pool is now sBTC, so the asset value and debt owed by both will always be equal.

Implications of the Pooled Debt System

From the examples above, we can conclude the following:

- sUSD minters only make a profit or loss relative to the Synth distribution of the debt pool. If the sUSD value of the debt pool increases more than the minter's Synth position, then a loss will be incurred. The opposite is also true;
- If a minter's Synth holdings are identical relative to the debt pool, no gains or losses will be incurred;
- Trading in the system is zero-sum. One user's profit necessarily equates to another's loss;
- The system won't be at risk of insolvency even if Synth prices fluctuate significantly, as the system's total value is fixed;
- The ability of SNX stakers to absorb loss is directly linked to the market cap of SNX

These implications are very important for SNX stakers who only wish to earn transaction fees. To avoid losing money from fluctuations in the value of the debt pool, it is recommended that you hold Synths in the same distribution as the debt pool. You can see the current Synth distribution within the debt pool on the [Synthetix Dashboard](#).

Non-SNX Stakers on Synthetix Exchange

If the only gains to be made were relative to all other traders in the system and all fees generated would come only from other SNX stakers, why would anyone want to stake SNX in the first place?

The answer is that those who are not SNX stakers can also trade and generate fees, providing SNX stakers with an external source of revenue. Currently, there are two primary channels for this:

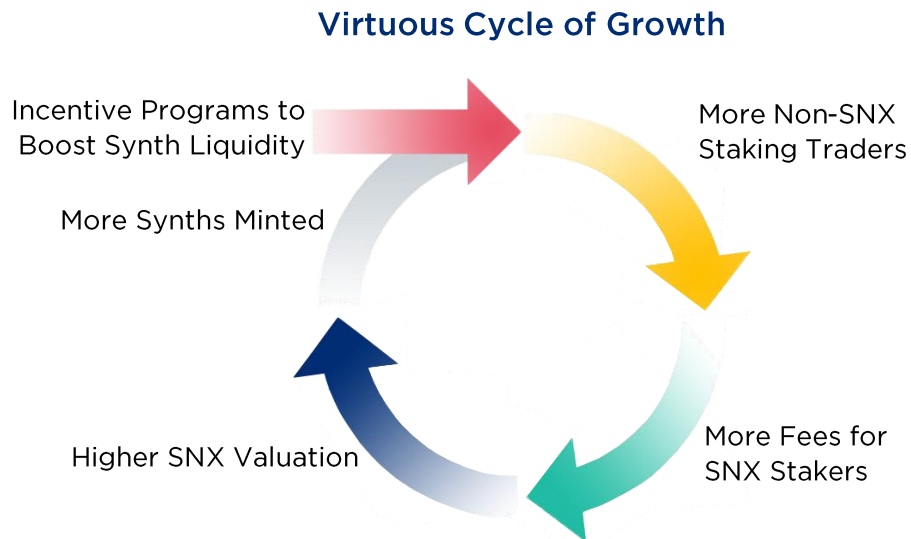
1. Minters can sell the sUSD minted upon staking SNX via an external exchange like Uniswap. Non-stakers can then purchase the sUSD and trade on Synthetix Exchange;
2. Alternatively, minters can buy sETH with their sUSD on Synthetix Exchange, then sell the sETH on external exchanges

In order for the above to be viable, however, there must first be liquidity in sETH and sUSD. Without sufficient liquidity, non-SNX staking users would incur prohibitive levels of slippage as they enter and exit the system. This creates a chicken and egg dilemma – in order for SNX stakers to be willing to stake and mint, more non-staking users must first be attracted, and vice versa.

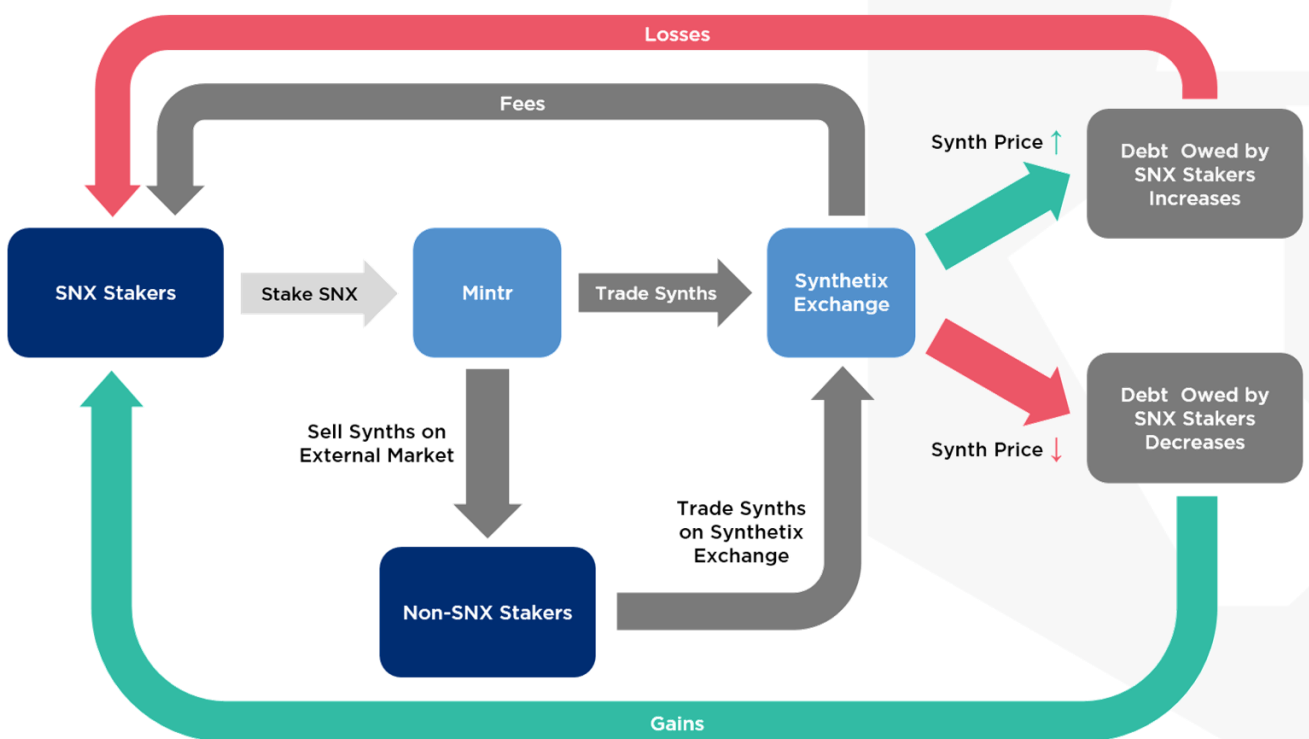
To address this, Synthetix began diverting a portion of its token inflation budget towards users who supply sUSD and sETH on decentralized token swappers [Curve.fi](#) and [Uniswap](#). This is equivalent to SNX holders (equity holders) paying participants to provide liquidity. Liquid Synth markets will attract more traders, who will then generate more fees for SNX stakers, allowing the SNX inflationary program to be wound down once a critical mass of users has been reached.

You can read more about the sUSD program [here](#), and the sETH initiative [here](#). For more information, feel free to read our [report](#) analyzing the returns of DeFi protocol.

The diagram below shows the virtuous cycle Synthetix is using to bootstrap user growth and boost the system's value as a whole:



We can also use a flow chart to represent the relationships within the Synthetix ecosystem. Note that Synth holders' gains are accompanied by SNX stakers' loss and vice versa.



4. Analysis

We will now go through what we see as the advantages and disadvantages of the way Synthetix is set up, as summarized below:

Advantages	Disadvantages
Theoretically unlimited liquidity / no slippage	Smart contract risk
Well-designed token economics	Especially reliant on price oracles
Allows trustless on-chain exposure to any asset	Complex and potentially counterintuitive
Open source and autonomous	Inherent instability of using native token as collateral
	No liquidation mechanism
	High collateral ratio

4.1 Advantages

Theoretically Unlimited Liquidity / No Slippage

Because of the way Synthetix Exchange is designed, users are able to freely convert between Synths without slippage costs, with the only limitation on trade size being the total value of outstanding Synths. As long as there are enough SNX stakers to collateralize the system, users will be able to find liquidity.

Well-Designed Token Economics

As we mentioned in the prior section, one of the main issues the Synthetix team faced was how to grow the protocol while protecting the system from insolvency risk. The solution to use token inflation as a multi-pronged tool to incentivize SNX stakers and encourage more liquid external markets in Synths could likely succeed in bootstrapping user growth.

Trustless On-Chain Exposure to Any Asset

Synthetix has seemingly managed to solve the problem of creating trustless, tokenized versions of real-world assets without having to actually holding these assets in reserve. Traditionally, only centralized token issuers could tokenize assets such as gold and silver. Theoretically, any asset can be traded on Synthetic Exchange as a Synth, as long as price feeds are available. Eventually, this could include assets such as stocks, bonds, and real estate.

Open Source and Autonomous

Just like other DeFi protocols, Synthetix's code is open source and available for anyone to inspect. This gives users transparency and allows for flaws in the code to be found by knowledgeable members of the public. It also allows for the code to be forked and/or improved in case the protocol's operations or governance are somehow compromised.

Furthermore, Synthetix will continue to operate in its current state as long as the Ethereum network is functional. This is in contrast to centralized service providers, where users are locked out if the system is down for whatever reason.

4.2 Disadvantages

Smart Contract Risk

Like all decentralized applications build on programmable blockchains, Synthetix removes custodial risk and replaces it with smart contract risk, where users could lose funds if attackers find any vulnerabilities.

For example, two attacks occurred [in February 2020](#) on the DeFi lending platform bZx, where an attacker or attackers manipulated the price oracle. This allowed the attacker(s) to borrow much more than they were supposed to be able to, leaving bZx lenders with combined losses of almost US\$1 million.

Especially Reliant on Price Oracles

Though this point is related to the previous one, we feel it deserves a special mention. The core functions of Synthetix all depend on price oracles to deliver external price data reliably, and most importantly, without egregious data quality issues.

An attack on Synthetix occurred in 2019, showing how sensitive Synthetix is to the quality of price data. A trader was able to manipulate the price feed of KRW, which allowed him/her to generate unlimited profit at the expense of SNX holders. After a series of trades, this trader made a profit of US\$1 billion in less than an hour. Fortunately, the trader agreed to forgo his profits in exchange for a bug bounty since he was unable to cash out his profits.

After the incident, Synthetix integrated decentralized price oracle Chainlink [in December 2019](#). Although a step in the right direction, we have seen that Chainlink also has susceptibilities – on Black Thursday in March 2020, the oracle's price feeds for ETH [went down for six hours](#) due to network congestion.

Complex and Potentially Counterintuitive

As you have seen in our report, the Synthetix protocol is not very easy to understand. The debt pool and pooled counterparty mechanism result in some strange economics between SNX stakers, which if not well-understood could result in losses which would otherwise have been avoidable.

For example, stakers might believe that minting sUSD, a stablecoin, is safe since only USD risk is assumed. In reality, however, they are exposed to the price movements of all other Synths in the debt pool.

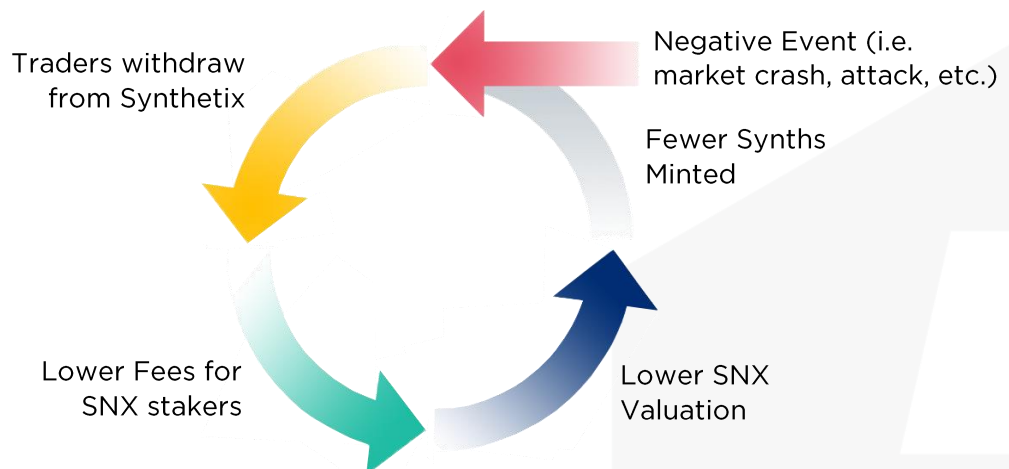
An add-on to this point is that being a SNX staker and sUSD minter entails active maintenance of Synth holdings and collateralization levels. In return, they can earn fees generated on the exchange and inflationary rewards without taking undue market risk.

Inherent Instability of Native Token as Collateral

In Synthetix, the SNX token acts as both collateral and as the equity token whereby stakers can earn fees generated from the platform. As we noted in the diagram of this virtuous cycle of user growth leading to higher fees, this could boost SNX valuation when platform growth is expected to be high.

However, the flipside is also true. If growth expectations fall for any reason, internal or external, this can quickly lead to a *vicious cycle* whereby lower user growth leads to lower SNX valuations.

Vicious Cycle of Negative or Low Growth



Because of the potential for positive and negative feedback loops, the volatility of the SNX token is extremely high, with standard deviation of 157% annualized in USD terms. What this means is that it is possible for an external event such as a disastrous crypto market crash or an attack on the platform to cause system insolvency.

No Liquidation Mechanism

Theoretically, the above would not be such a big issue if Synthetix had a liquidation mechanism whereby the system could be protected from insolvency. This would help to deleverage the system before a state of under-collateralization can be reached. However, no such apparatus exists yet, though in the team's credit, [one is being worked on](#).

High Collateral Ratio

The combination of both SNX volatility and the lack of a liquidation mechanism means that the collateral ratio for SNX stakers must be set to extremely high level of 800% in order to minimize the risk of system insolvency. This is obviously undesirable from the perspective of stakers, who need to stake a large amount of capital to only be able to mint a small fraction of that value in Synths.

Because the maximum potential supply of Synths is so limited by the collateral ratio, in our view this unnecessarily limits the market cap of Synths, and by extension, the growth of the protocol as a whole. Hopefully the collateral ratio can be lowered once a liquidation mechanism is implemented.

4.3 Interactions with Other Protocols

Where does the Synthetix protocol fit into the DeFi space as a whole?

External Synth Liquidity Pool on Decentralized Exchanges

Synthetix diverts a portion of its token inflation budget towards users who supply sUSD and sETH on decentralized token swappers [Curve.fi](#) and [Uniswap](#). Liquid Synth markets will attract more traders, who will then generate more fees for SNX stakers, allowing the SNX inflationary program to be wound down once a critical mass of users has been reached.

Chainlink as Price Oracle

As mentioned earlier, Synthetix [integrated Chainlink](#) as price oracle in December 2019. This is a big step forward for Synthetix, as the protocol is very reliant on quality external price feeds.

Future Use of Synths as Collateral on Lending Platforms

If Synthetix continues to grow rapidly as a platform, we could one day see Synth versions of real-world assets being accepted as collateral on lending platforms such as MakerDAO and Compound. This could include collateralized lending based on commodities, real estate, stocks, bonds, and more! Though we must note Synthetix is nowhere near the size required to achieve this for the foreseeable future.

5. Summary

5.1 Conclusion

In summary, Synthetix is an innovative platform that allows users to trustlessly issue and trade synthetic assets entirely on-chain. In our view, this is a promising protocol that is well-designed, despite being somewhat complex. We are excited to see the future growth of Synthetix as well as its knock-on effects to the rest of the crypto ecosystem.

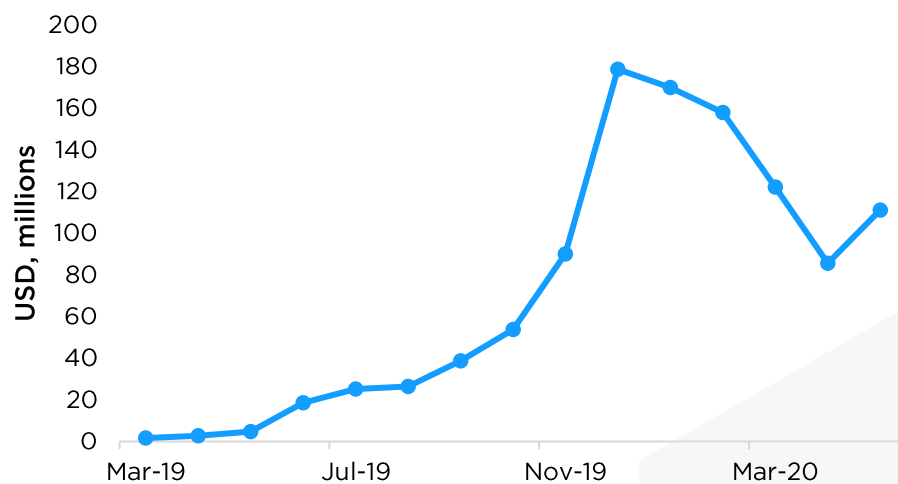
Key Takeaways

- Synthetix is a platform that allows trustless, on-chain issuance and trading of synthetic assets called Synths, which currently include synthetic cryptocurrencies and commodities;
- SNX stakers earn fees and inflationary rewards in exchange for providing the essential function of maintaining sufficient levels of collateral to absorb Synth price fluctuations;
- The protocol's debt pool mechanism can be difficult for new users to understand, which could lead to unintended risks and losses;
- Synthetix Exchange gives users unlimited liquidity and no slippage on trades up to the value of SNX collateral in its systems;
- The SNX token's inflation scheme is well-designed to give active participants a decent incentive to help the system grow;
- Although our view of the protocol is positive in general, there are significant risk factors at play, namely price oracle risk, insolvency risk, and extreme SNX volatility

5.2 Statistics

The amount of USD locked in Synthetix has been growing at a rapid rate, from US\$1.6 million in March 2019 to US\$111 million as of May 2020. Growth has suffered in recent months, however, due to the attacks on the bZx lending platform in February 2020 and recent crypto price volatility.

USD Locked in Synthetix



6. References

CoinMarketCap. (n.d.). *Synthetix Network Token*. Retrieved from <https://coinmarketcap.com/currencies/synthetix-network-token/>

DeFi Pulse. (2020). Retrieved from <http://defipulse.com>

Synthetix. (2020). *Synthetix Litepaper*. Retrieved from https://www.synthetix.io/uploads/synthetix_litepaper.pdf

Synthetix. (n.d.). *Synthetix*. Retrieved from <https://www.synthetix.io/>

Synthetix. (n.d.). *Synthetix Blog*. Retrieved from <https://blog.synthetix.io>

Synthetix. (n.d.). *Synthetix Dashboard*. Retrieved from <https://dashboard.synthetix.io/>

Synthetix. (n.d.). *Synthetix Exchange*. Retrieved from <https://www.synthetix.io/products/exchange>

Synthetix. (n.d.). *Synthetix Mintr*. Retrieved from <https://www.synthetix.io/products/mintr>



e. contact@crypto.com