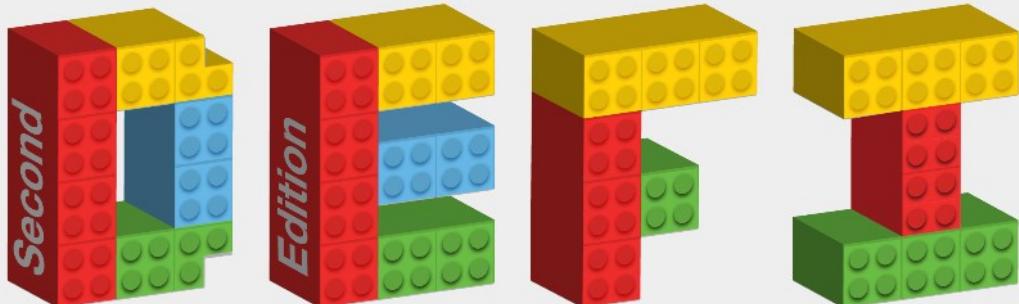
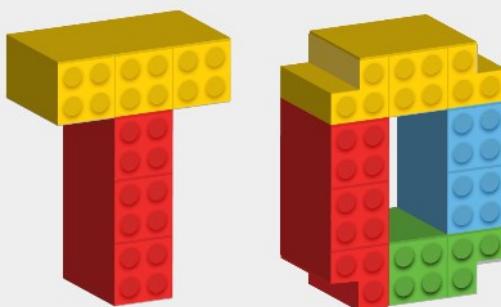
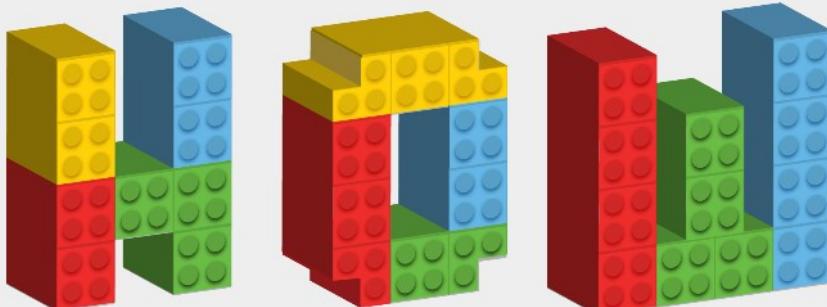


"This is an excellent resource for anyone who wants a comprehensive introduction to DeFi."
Kain Warwick, Founder of Synthetix



BEGINNER

Decentralized Finance is taking over the world.
Learn how to get started and join the revolution.



CoinGecko

How to DeFi: Beginner

2nd Edition, May 2021

Darren Lau, Daryl Lau, Teh Sze Jin, Kristian
Kho, Erina Azmi, Benjamin Hor, Lucius
Fang, Khor Win Win

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“DeFi can be intimidating and overly complex, but this book makes it simple.”

– Seb Audet, Founder of Zapper

“If I didn't know anything about DeFi and needed to learn from scratch, this book is where I'd start.”

– Felix Feng, CEO of TokenSets

“This book makes it easy for beginners to get started with DeFi.”

– Hugh Karp, CEO of Nexus Mutual

“There is a lot of content about decentralized finance available but nothing matches this depth and comprehensiveness of this book.”

– Leighton Cusack, CEO of PoolTogether

“This is an excellent resource for anyone who wants a comprehensive introduction to DeFi.”

– Kain Warwick, Founder of Synthetix

“This book details the new economies created by a generation of bankless pioneers. It's the best introduction you could ask for.”

– Mariano Conti, Head of Smart Contracts at Maker Foundation

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INTRODUCTION

So much development has taken place in DeFi since we published the First Edition of *How to DeFi: Beginner* in March 2020! **DeFi**, the acronym for **Decentralized Finance**, is currently one of the fastest-growing sectors in the blockchain and cryptocurrency space. With increasing institutional acceptance, one may soon see DeFi integrated within the traditional financial system in the future.

Starting from humble beginnings in late-2017, DeFi gained traction in the wider community during the summer of 2020 and has not stopped since; protocols in this space are constantly innovating. In this Second Edition of *How to DeFi: Beginner* book, we will help you delve into the world of DeFi by categorizing the industry into concise chapters, now updated with the latest development in the space (if you read the First Edition of *How to DeFi: Beginner*, some of the content might already be outdated—that's how fast it moves!)

As previously done, we will be explaining what DeFi is, how it is crucial for the community, and the various elements of DeFi, such as decentralized stablecoins, exchanges, lending, derivatives, and insurance. In each of these chapters, we will provide step-by-step guides to assist you in interacting with at least one of the DeFi protocols.

Throughout the book, we will have **Recommended Readings** at the end of each chapter. In these sections, we will share supplementary reading materials that we believe will be useful as you dive deeper into the DeFi

ecosystem. All credits, of course, go to their respective authors. Kudos to them for making DeFi more accessible!

How to DeFi: Beginner book is aimed at DeFi beginners. For the DeFi enthusiasts who want to delve deeper, we have published the *How to DeFi: Advanced* book with more in-depth analysis. Therefore, we recommend beginners start with this book before proceeding to the Advanced version.

We hope that the contents of this book will help you get up to speed with DeFi. We look forward to having you join us in this movement!

CoinGecko Research Team

Darren Lau, Daryl Lau, Teh Sze Jin, Kristian Kho, Erina Azmi, Benjamin Hor, Lucius Fang, Khor Win Win

1 May 2021

PART ONE: CENTRALIZED & DECENTRALIZED FINANCE

CHAPTER 1: THE TRADITIONAL FINANCIAL INSTITUTIONS

In our attempt to shed light on people new to DeFi, we will start by first going through the basics of how traditional financial institutions work. For simplicity, we will focus on the highest leveraged institutions in the traditional financial system, the banks, and discuss its key areas to see the potential risks.

The Banks

Banks are the financial industry's giants that facilitate payments, accept deposits, and offer lines of credit to individuals, businesses, other financial institutions, and even governments. They are so large that the total market capitalization of the top 10 banks in the world is \$2 trillion. In April 2021, the total market capitalization of the entire cryptocurrency market surpassed \$2 trillion.

Banks are vital parts of the moving machine that is the financial industry—they enable money to move around the world by providing value transfer services (deposit, withdrawal, transfers), extending credit lines (loans), and more. However, banks are managed by humans and governed by policies that are prone to human-related risks such as mismanagement and corruption.

Top 10 Global Banks 2019			
Rank	Bank	Country	Market Cap. (\$ bn)
1	ICBC	China	338
2	China Construction Bank	China	287
3	Agricultural Bank of China	China	243
4	Bank of China	China	230
5	JP Morgan Chase	US	209
6	Bank of America	US	189
7	Wells Fargo	US	168
8	Citigroup	US	158
9	HSBC	UK	147
10	Mitsubishi UFJ	Japan	146

Source: [Top 1000 World Banks 2019](#)

The global financial crisis of 2008 exemplified excessive risk-taking by banks, and governments were forced to make massive bailouts of the banks. The crisis exposed the shortcomings of the traditional financial system and highlighted a need for it to be better.

DeFi seeks to build a better financial landscape made possible by the advent of the internet and blockchain technology, particularly in three key segments of the banking system:

1. Payment & clearance system (remittance)
2. Accessibility
3. Centralization & Transparency

1. Payment and Clearance System

If you have tried to send money to someone or a business in another country, you know this pain all too well—remittances involving banks worldwide typically take a few working days to complete and involve all sorts of fees. To make matters worse, there may also be issues with documentation, compliance with anti-money laundering laws, privacy concerns, and more.

For example, suppose you live in the US and would like to send \$1,000 from your bank account in the US to your friend's bank account in Australia. There are typically three fees involved: the exchange rate from your bank, the international wire outbound fee, and the international wire inbound fee. Additionally, it will take a few working days for the recipient to receive the money, depending on the recipient bank's location.

Cryptocurrencies that power the DeFi movement allow you to bypass intermediaries who take the lion's share of these transfers' profits. It is likely to be quicker as well—your transfers will be processed with no questions asked with relatively lower fees compared to banks. For example, the transfer of cryptocurrencies to any account in the world would take anywhere between 15 seconds to 5 minutes depending on several factors, along with a small fee.

2. Accessibility

Chances are if you are reading this book, you are banked and have access to financial services offered by banks—to open a savings account, take a loan, make investments, and more. However, many others are less fortunate and do not have access to even the most basic savings account.



Heatmap of the Unbanked (Source: [Global Findex, World Bank, 2017](#))

The World Bank estimates that as of 2017, there are 1.7 billion people who do not own an account at a financial institution, and more than half of them are from developing nations. They come mainly from poor households, and some of their main reasons for not having a bank account are poverty, geographical, and trust issues.

However, the World Bank also estimates that two-thirds of the 1.7 billion unbanked population have access to mobile phones. Therefore, with an internet connection, DeFi Dapps can be the gateway for millions of people in the unbanked population to access financial products and conduct financial transactions without going through lengthy verification processes as required by traditional banks.

DeFi represents a movement that seeks to push borderless, censorship-free, and accessible financial products for all. DeFi protocols do not discriminate and level the playing field for everyone.

3. Centralization & Transparency

There is no denying that traditional, regulated financial institutions that comply with government laws and regulations are some of the most secure places to park funds. But they are not without flaws—even large banks can fail. Washington Mutual, with over \$188 billion in deposits, and Lehman Brothers, with \$639 billion in assets, have both failed in 2008. In the US alone, over 500 bank failures have been recorded.

Banks are one of the centralized points of failure in the financial system. The fall of Lehman Brothers triggered the start of the 2008 financial crisis. The centralization of power and funds in the hands of the banks is dangerous, and rightfully so, looking at past incidents.

Transparency also ties into this—there is no way for regular investors to know what financial institutions do entirely. Some of the events leading up to the 2008 financial crisis included credit rating agencies giving AAA ratings (best & safest investments) to high-risk mortgage-backed securities.

It will be different with DeFi. DeFi protocols built on top of public blockchains such as Ethereum are mostly open-sourced for audit and transparency purposes. They usually have decentralized governing organizations to ensure that everyone knows what is happening and that no bad actors can single-handedly make bad decisions.

DeFi protocols are written as lines of codes—you cannot cheat the codes as it treats every participant equally without discrimination. The codes run exactly as they are programmed to, and any flaws quickly become evident as it is open for public scrutiny.

However, this means that only people who can understand code would be able to determine the actual functionalities of the end-product. In practice, most users are unable to read the code and rely on other factors such as the developers' reputation, word-of-mouth, other developers' comments, and community approval. In other words, DeFi protocols rely on decentralized peer-to-peer review. DeFi's biggest strength is thus its ability to remove intermediaries while operating with zero censorship.

Decentralized Finance vs. Traditional Finance

Friction, inaccessibility, and regulatory uncertainties are some of the major issues plaguing the current banking system. Unfortunately, not everyone is privileged to be banked in the current financial system, nor can they compete financially on a level playing field.

One only needs to look at the conundrum behind the GameStop (GME) trades, where a bunch of small-time investors decided to buy GME shares because big-time hedge funds heavily shorted it. Financial apps like Robinhood had to step in and restrict GME trades because of “extraordinary volatility”. Some might take this at face value, while others will note that one of Robinhood’s biggest customers is Citadel LLC. Citadel is a company that invested in Melvin Capital, which lost billions of dollars over their short on GME.

The DeFi movement is about bridging these gaps and making finance accessible to everyone without any form of censorship. In short, DeFi opens up huge windows of opportunities and allows users to access various financial instruments without any restriction on race, religion, age, nationality, or geography.

When comparing both traditional and decentralized financial products, there will be pros and cons on each side. In this book, we will walk you through the concepts and possibilities of decentralized finance so that you will know how to use its best features to solve real-world problems.

In [Chapter 2](#) we will provide an overview of DeFi and some of its Decentralized Applications to help capture the underlying notions on how DeFi works.

Recommended Readings

1. Decentralized Finance vs Traditional Finance: What You Need To Know (Stably) <https://medium.com/stably-blog/decentralized-finance-vs-traditional-finance-what-you-need-to-know-3b57aed7a0c2>
2. The 7 Major Flaws of the Global Financial System (Jeff Desjardins) <https://www.visualcapitalist.com/7-major-flaws-global-financial-system>
3. Decentralized Finance: An Emerging Alternative to the Global Financial System (Frank Cardona) <https://www.visualcapitalist.com/decentralized-finance/>
4. How Decentralized Finance Could Make Investing More Accessible (Jeff Desjardins) <https://www.visualcapitalist.com/how-decentralized-finance-could-make-investing-more-accessible/>
5. What is Decentralized Finance? <https://101blockchains.com/decentralized-finance-defi/>

CHAPTER 2: WHAT IS DECENTRALIZED FINANCE (DEFI)?

Decentralized Finance or DeFi is the movement that allows users to utilize financial services such as borrowing, lending, and trading without the need to rely on centralized entities. These financial services are provided via Decentralized Applications (Dapps), the majority of which are deployed on the Ethereum platform.

While it is helpful to understand how Ethereum works to visualize the ecosystem better, you do not need to be an Ethereum expert to utilize the tools offered by DeFi. We will touch more on Ethereum in the next chapter.

DeFi is not a single product or company, but a range of financial services which emulates traditional financial industries, including banking, insurance, bonds, money markets and more. DeFi Dapps enable users to combine these services to achieve desired financial goals. It is often called money LEGOs due to its composability.

For DeFi Dapps to work, a collateral locked into smart contracts is usually required. The cumulative collateral locked in DeFi Dapps is often referred to as the Total Value Locked, which serves as a growth indicator of the DeFi ecosystem. In our earlier edition, we highlighted that the Total Value Locked at the start of 2019 measured around \$275 million and reached a high of \$1.2 billion in February 2020.

As of April 2021, the Total Value Locked is a staggering \$67 billion in Ethereum alone which goes to show how far we have come. This does not even include other blockchain networks such as Binance, Solana, and others. The Total Value Locked for all the chains collectively adds up to \$86 billion.¹

The DeFi Ecosystem

With such rapid growth, it would be impossible for us to cover everything DeFi offers in this book. That is why we have selected a few categories and DeFi Dapps that we believe are important and crucial for beginners to understand before stepping into the DeFi ecosystem.

These DeFi Dapps stand to revolutionize traditional financial services by removing the need for any middlemen. However, you should note that DeFi in its current state is still highly nascent and experimental, with many projects rapidly improving each day. As time goes on, DeFi may develop further and look entirely unrecognizable from what it is today. Nevertheless, it is helpful to understand the early beginnings of DeFi, and you can still take advantage of the features offered by DeFi Dapps today with the right know-how.

How Decentralized is DeFi?

It is not easy to answer how decentralized DeFi is. For simplicity, we will separate the degrees of decentralization into three categories: centralized, semi-decentralized and completely decentralized.

1. Centralized
 - Characteristics: Custodial, uses centralized price feeds, centrally-determined interest rates, centrally-provided liquidity for margin calls
 - Examples: Salt, BlockFi, Nexo and Celsius
2. Semi-Decentralized (has one or more of these characteristics but not all)
 - Characteristics: Non-custodial, decentralized price feeds, permissionless initiation of margin calls, permissionless margin

¹ DeFi Llama. Retrieved April 1, 2021 from <https://defillama.com/home>

- liquidity, decentralized interest rate determination, decentralized platform development/updates
 - Examples: Compound, MakerDAO, dYdX, and bZx
3. Completely Decentralized
- Characteristics: Every component is decentralized
 - Examples: No DeFi protocol is completely decentralized yet.

Currently, most DeFi dapps are sitting in the semi-decentralized category. You may read more on the various decentralization components in [Kyle Kistner's article](#) in the Recommended Readings. Now that you have a better understanding of what being decentralized means, let's move on to the key categories of DeFi.

DeFi Key Categories

In this book, we will be covering nine major categories of DeFi. Although Governance is not strictly a DeFi category, we believe it is also important to discuss how protocols govern themselves, thus it deserves a chapter of its own.

1. Stablecoins

The prices of cryptocurrencies are known to be highly volatile. It is common for cryptocurrencies to have intraday swings of over 10%. To mitigate this volatility, stablecoins that are pegged to other stableassets such as the USD were created.

Tether (USDT) was one of the first centralized stablecoins to be introduced. Every USDT is supposedly backed by \$1 in the issuer's bank account. However, one major downside to USDT is that users need to trust that the USD reserves are fully collateralized and actually exist.

Decentralized stablecoins aim to solve this trust issue. They are created via an over-collateralization method, operate fully on decentralized ledgers, and are governed by decentralized autonomous organizations. Anyone can publicly audit their reserves.

While stablecoins are not financial applications themselves, they are essential in making DeFi applications more accessible to everyone by having a stable store of value.

2. Lending and Borrowing

Traditional financial systems require users to have bank accounts to utilize their services, a luxury that 1.7 billion people currently do not have. Borrowing from banks comes with other restrictions, such as having a good credit score and having sufficient collateral to convince the banks that one is credit-worthy and able to repay a loan.

Decentralized lending and borrowing remove this barrier, allowing anyone to collateralize their digital assets and use this to obtain loans. One can also earn a yield on their assets and participate in the lending market by contributing to lending pools and earning interest on these assets. With decentralized lending and borrowing, there is no need for a bank account nor checking for credit-worthiness.

3. Exchanges

To exchange one cryptocurrency for another, one can use exchanges such as Coinbase or Binance. Exchanges like these are centralized exchanges, meaning they are both the intermediaries and custodians of the traded assets. Users of these exchanges do not have complete control of their assets, putting their assets at risk if the exchanges get hacked and are unable to repay their obligations.

Decentralized exchanges aim to solve this issue by allowing users to exchange cryptocurrencies without giving up custody of their coins. By not storing any funds on centralized exchanges, users do not need to trust the exchanges to stay solvent.

4. Derivatives

A derivative is a contract whose value is derived from another underlying asset such as stocks, commodities, currencies, indexes, bonds, or interest rates.

Traders can use derivatives to hedge their positions and decrease their risk in any particular trade. For example, imagine you are a glove manufacturer and want to hedge yourself from an unexpected increase in rubber price. You can buy a futures contract from your supplier to deliver a specific amount of rubber at a specific future delivery date at an agreed price today.

Derivatives contracts are mainly traded on centralized platforms. DeFi platforms are starting to build decentralized derivatives markets. We will go through this in further detail in [Chapter 8](#).

5. Fund Management

Fund management is the process of overseeing your assets and managing its cash flow to generate a return on your investments. There are two main types of fund management - active and passive fund management. Active fund management has a management team making investment decisions to beat a particular benchmark, such as the S&P 500. Passive fund management does not have a management team but is designed in such a way to mimic the performance of a particular benchmark as closely as possible.

In DeFi, some projects have started to allow passive fund management to occur in a decentralized manner. The transparency of DeFi makes it easy for users to track how their funds are being managed and understand the cost they will be paying.

6. Lottery

As DeFi continues to evolve, creative and disruptive financial applications will emerge, democratizing accessibility and removing intermediaries. Putting a DeFi spin onto lotteries allows for the removal of custodianship of the pooled capital into a smart contract on the Ethereum Blockchain.

With the modularity of DeFi, it is possible to link a simple lottery Dapp to another DeFi Dapp and create more value. One DeFi Dapp that we will explore in this book allows participants to pool their capital together. The pooled money is then invested into a DeFi lending Dapp

and the interest earned is given to a random winner at a set interval. Once the winner is selected, the lottery purchasers get their lottery tickets refunded, ensuring no-loss to all participants.

7. Payments

A key role of cryptocurrency is to allow decentralized and trustless value transfer between two parties. With the growth of DeFi, more creative payment methods are being innovated and experimented upon.

One such DeFi project explored in this book aims to change the way we approach payment by reconfiguring payments as streams instead of transactions we are familiar with. The possibility of providing payments as streams open up a plethora of potential applications of money. Imagine “pay-as-you-use” but on a much more granular scale and higher accuracy.

The nascent of DeFi and the rate of innovation will undoubtedly introduce new ways of thinking on how payments work to address many of the current financial system’s shortcomings.

8. Insurance

Insurance is a risk management strategy in which an individual receives financial protection or reimbursement against losses from an insurance company in the event of an unfortunate incident. It is common for individuals to purchase insurance on cars, home, health, and life. But is there decentralized insurance for DeFi?

All of the tokens locked within smart contracts are potentially vulnerable to smart contract exploits due to the large potential payout possible. While most projects have gotten their codebases audited, we never know if the smart contracts are truly safe, and there is always a possibility of a hack that may result in a loss. The risks highlight the need for purchasing insurance, especially if one deals with large amounts of funds on DeFi. We will explore several decentralized insurance options in this book.

9. Governance

Governance is essentially crypto's idea of business management. In order for DeFi protocols to manage a project, governance tokens are often introduced to give users voting power and have a say in the protocol's roadmap. Naturally, multiple toolkits and Dapps have also been developed to facilitate effective governance and complement existing systems.

Recommended Readings

1. Decentralized Finance Explained (Yos Riady)
<https://yos.io/2019/12/08/decentralized-finance-explained/>
2. A beginner's guide to DeFi (Linda J. Xie)
<https://nakamoto.com/beginners-guide-to-defi/>
3. A Beginner's Guide to Decentralized Finance (DeFi) (Coinbase)
<https://blog.coinbase.com/a-beginners-guide-to-decentralized-finance-defi-574c68ff43c4>
4. The Complete Beginner's Guide to Decentralized Finance (DeFi) (Binance)
<https://www.binance.vision/blockchain/the-complete-beginners-guide-to-decentralized-finance-defi>
5. 2019 Was The Year of DeFi (and Why 2020 Will be Too) (Mason Nystrom)
<https://consensys.net/blog/news/2019-was-the-year-of-defi-and-why-2020-will-be-too/>
6. DeFi: What It Is and Isn't (Part 1) (Justine Humenansky)
<https://medium.com/coinmonks/defi-what-it-is-and-isnt-part-1-f7d7e7afee16>
7. How Decentralized is DeFi? A Framework for Classifying Lending Protocols (Kyle Kistner)
<https://hackernoon.com/how-decentralized-is-defi-a-framework-for-classifying-lending-protocols-90981f2c007f>
8. How Decentralized is “Decentralized Finance”? (Aaron Hay)
<https://medium.com/coinmonks/how-decentralized-is-decentralized-finance-89aea3070e8f>
9. Mapping Decentralized Finance <https://outlierventures.io/wp-content/uploads/2019/06/Mapping-Decentralised-Finance-DeFi-report.pdf>

What is Decentralized Finance (DeFi)

10. Market Report: 2019 DeFi Year in Review
<https://defirate.com/market-report-2019/>
11. DeFi #3 – 2020: The Borderless State of DeFi
<https://research.binance.com/analysis/2020-borderless-state-of-defi>
12. Decentralized Finance with Tom Schmidt (Software Engineering Daily)
<https://softwareengineeringdaily.com/2020/02/25/decentralized-finance-with-tom-schmidt/>

PART TWO: GETTING INTO DEFI

CHAPTER 3: THE DECENTRALIZED LAYER: ETHEREUM

What is Ethereum?

As mentioned in [Chapter 1](#), the majority of the DeFi Dapps are currently being built on the Ethereum blockchain. But what exactly is Ethereum? Ethereum is a global, open-source platform for decentralized applications. You can think of Ethereum as a world computer that no one can shut down. On Ethereum, software developers can write smart contracts that control digital value through a set of criteria and are accessible anywhere in the world.

In this book specifically, we will be exploring Decentralized Applications (Dapps) that provide financial services known as DeFi. Smart contracts that software programmers write are the building blocks of these Dapps. These smart contracts are then deployed to the Ethereum network, where they will run 24/7. The network will maintain the digital value and keep track of the latest state.

What is a Smart Contract?

A smart contract is a programmable contract that allows two counterparties to set conditions of a transaction without needing to trust another third party for the execution.

For example, if Alice wants to set up a trust fund to pay Bob \$100 at the start of each month for the next 12 months, she can program a smart contract to:

1. Check the current date
2. At the start of each month, send Bob \$100 automatically
3. Repeat until the fund in the smart contract is exhausted

Using a smart contract, Alice has bypassed the need to have a trusted third-party intermediary (lawyers, escrow agents, etc.) to send the trust fund to Bob and made the process transparent to all involved parties.

Smart contracts work on the “if this, then that” principle. Whenever a specific condition is fulfilled, the smart contract will carry out the operation as programmed.

Multiple smart contracts are combined to operate with each other, known as decentralized applications (Dapps), to fulfill more complex processes and computations.

What is Ether (ETH)?

Ether is the native currency of the Ethereum blockchain.

It is like money and can be used for everyday transactions similar to Bitcoin. You can send Ether to another person to purchase goods and services based on the current market value. The Ethereum blockchain records the transfer and ensures the finality of the transaction.

Besides that, Ether is also used to pay the fee that allows smart contracts and Dapps to run on the Ethereum network. You can think of executing smart contracts on the Ethereum network as driving a car. To drive a car, you require fuel. To execute a smart contract on Ethereum, you need to use Ether to pay a fee known as Gas.

Ether is slowly evolving to become its unique reserve currency and store of value. Currently, in the DeFi ecosystem, Ether is the preferred asset choice used as the collateral underlying many DeFi Dapps. It provides safety and transparency to this financial system. Don’t worry if this confuses you, as we will be covering the topic in further depth throughout this book.

What is Gas?

On Ethereum, all transactions and smart contract executions require a small fee to be paid. This fee is called Gas. In technical terms, Gas refers to the unit of measure on the amount of computational effort required to execute an operation or a smart contract. The more complex the execution operation is, the more Gas that is needed to fulfill that operation. Gas fees are paid entirely in ETH.

The price of Gas can fluctuate from time to time depending on the network demand. When more people interact on the Ethereum blockchain, such as transacting in ETH or executing smart contract transactions, due to the limited amount of computing resources on the network, Gas price can increase. Conversely, when the network is underutilized, the Gas price would decrease.

Users may set gas fees manually. When the network gets congested due to high utilization, miners will prioritize transactions with the highest gas fees. Validated transactions will be finalized and added to the blockchain. If gas fees paid are too low, the transactions will be queued, taking a while to complete. Therefore, transactions with lower-than-average gas fees can take much longer to complete.

Gas price is typically denoted in *gwei*.

$1 \text{ gwei} = 0.000000001 \text{ ether}$

Assume a smart contract execution to transfer tokens require 21,000 gas units.

Assume the average market rate for gas price is 3 *gwei*.

$21,000 \text{ gas} \times 3 \text{ gwei} = 63,000 \text{ gwei} = 0.000063 \text{ ETH}$

When executing the transactions, you will pay a gas fee of 0.000063 ETH to process and validate your transaction in the network.

Example of how gas fees are calculated

What are Decentralized Applications (Dapps)?

In the context of Ethereum, Dapps are interfaces that interact with the blockchain through the use of smart contracts. Dapps look and behave like

regular web and mobile applications, except that they interact with a blockchain and in different ways. Some of the ways include requiring ETH to use the Dapp, storing user data onto the blockchain such that it is immutable, and so on.

What are the benefits of Dapps?

Dapps are built on top of decentralized blockchain networks such as Ethereum and usually have the following benefits:

- **Immutability:** Nobody can change any information once it's on the blockchain.
- **Tamper-proof:** Smart contracts published onto the blockchain cannot be tampered with without alerting every other participant on the blockchain.
- **Transparent:** Smart contracts powering Dapps are openly auditable.
- **Availability:** As long as the Ethereum network remains active, Dapps built on it will remain active and usable.

What are the disadvantages of Dapps?

While a blockchain offers many benefits, there are also many different downsides:

- **Immutability:** Smart contracts are written by humans and can only be as good as the person who wrote them. As human errors are unavoidable, immutable smart contracts have the potential to compound mistakes into big problems.
- **Transparent:** Openly auditable smart contracts can also become attack vectors for hackers as the hackers can view the code to find exploits.
- **Scalability:** In most cases, the bandwidth of a Dapp is limited to the blockchain it resides on.

What else can Ethereum be used for?

Besides creating Dapps, Ethereum can also be used for two other functions—creating Decentralized Autonomous Organizations (DAO) or issuing other cryptocurrencies.

A DAO is a fully autonomous organization that is not governed by a single person but is instead governed through code. This code is based on smart contracts and enables DAOs to replace how traditional organizations are typically run. As it runs on code, it would be protected from human intervention and will operate transparently. There would be no effect by any outside influence. Governance decisions or rulings would be decided via DAO token voting.

Speaking of tokens, Ethereum can be used as a platform to create other cryptocurrencies. There are currently two popular protocols for tokens on the Ethereum Network: ERC-20 and ERC-721. Both ERC-20 and ERC-721 are protocol standards that define rules and standards for issuing tokens on Ethereum.

ERC-20 tokens are fungible, meaning they are interchangeable and of the same value. On the other hand, ERC-721 tokens are non-fungible, meaning they are unique and non-interchangeable. A simple analogy would be to think of ERC-20 as money and ERC-721 as collectibles like action figures or baseball cards

Ethereum's Future

Ethereum's popularity continues to grow as it becomes the central pillar of DeFi growth. With the first mover's advantage in hand, the number of users and transactions continues to grow each day. While many herald this as a success for DeFi, the surge in demand is putting a major strain on the network.

Rising gas fees are among the most significant issues as users now need to pay exorbitant fees during peak hours. The high gas fees have led to the rapid development of competing blockchains such as Polkadot, where the network is touted to be more efficient (alternative blockchains are discussed more in-depth in our Advanced Book).

To ensure the continued success of the Ethereum network, the Ethereum community is planning to introduce an upgrade known as ETH 2.0. ETH 2.0 is a massive undertaking that spans over three years and utilizes 'sharding'

techniques. Once the update is fully incorporated, the network will become more scalable, solving the high gas fees issue.

And that's it for Ethereum! If you are keen to own your first cryptocurrency or try your first Dapp, we will be covering several interesting DeFi protocols in the following chapters. We will be providing overviews and step-by-step guides. Before you can begin your journey, you will first need an Ethereum Wallet.

Recommended Readings

1. What is Ethereum? [The Most Updated Step-by-Step-Guide!] (Ameer Rosic) <https://blockgeeks.com/guides/ethereum/>
2. Smart Contracts: The Blockchain Technology That Will Replace Lawyers (Ameer Rosic) <https://blockgeeks.com/guides/smart-contracts/>
3. What is Ethereum Gas? [The Most Comprehensive Step-By-Step Guide Ever!] (Ameer Rosic) <https://blockgeeks.com/guides/ethereum-gas/>
4. The trillion-dollar case for ETH (Lucas Campbell) <https://bankless.substack.com/p/the-trillion-dollar-case-for-eth-eb6>
5. Ethereum: The Digital Finance Stack (David Hoffman) <https://medium.com/pov-crypto/ethereum-the-digital-finance-stack-4ba988c6c14b>
6. Ether: A New Model for Money (David Hoffman) <https://medium.com/pov-crypto/ether-a-new-model-for-money-17365b5535ba>
7. The Eth2 vision <https://ethereum.org/en/eth2/vision/>

CHAPTER 4: ETHEREUM WALLETS

A wallet is a user-friendly interface to the blockchain network. It manages your private keys, which are basically keys to the lock on your cryptocurrencies' vault. Wallets allow you to receive, store and send cryptocurrencies.

Custodial vs Non-Custodial Wallets

There are two kinds of wallets—custodial and non-custodial wallets. Custodial wallets are wallets where third-parties keep and maintain control over your cryptocurrencies on your behalf. Non-custodial wallets are wallets where you take full control and ownership of your cryptocurrencies. This is similar to the mantra espoused by many people in the blockchain industry to “be your own bank”.

By using a custodial wallet, you trust an external party to store your coins safely. This may be convenient as you do not need to worry about private key security and only worry about account credentials security, similar to how you would have to protect your email account. However, by trusting a third party with your cryptocurrencies, you open yourself up to the risk of the custodian losing your cryptocurrencies through mismanagement or hacks. There have been numerous incidents where custodial wallets lost their cryptocurrencies. The most prominent example was Mt. Gox, which lost over 850,000 bitcoin worth over \$450 million in 2014.

By using a non-custodial wallet, you trust no external party and only yourself to ensure that your cryptocurrencies are safe. However, by using a non-custodial wallet, you pass the burden of security to yourself, and you have to be fully equipped to store your private keys safely. If you lose your private keys, you will lose access to your cryptocurrencies too.

At CoinGecko, we believe in the “not your keys, not your coin” mantra. We believe that you should educate yourself in all the best security practices and trust only yourself to keep your coins safe.

Which Wallet Should I Use?

There are many cryptocurrency wallets out there in the market. In this book, we will walk through two DeFi friendly wallets for you to easily start interacting with the Ethereum network.

Mobile Users: Argent

For mobile users, you may consider using the Argent wallet. Argent is a non-custodial wallet that offers ease-of-use and high security, something which does not always go hand-in-hand. It does so by utilizing Argent Guardians, which are people, devices, or third-party services that can verify your identity.

Examples include family and friends who are also Argent users, other hardware or Metamask wallets, or two-factor authentication services. By utilizing this limited circle of trust network, Argent is rethinking the need for paper-based seed phrase backups when recovering accounts.

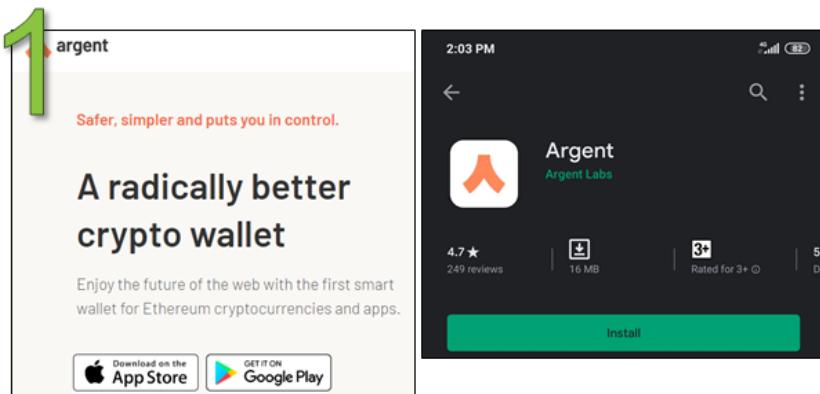
Argent Guardians allows you to lock your wallet and instantly freeze all funds if you believe your wallet has been compromised. Your wallet will be automatically unlocked after five days, or you can request for your Argent Guardian to unlock it sooner.

You may also set additional security measures to improve your wallet security, such as a daily transaction limit. This is useful in preventing hackers from siphoning funds from your Argent wallet if they gain access to your wallet. Whenever your daily transaction limit is hit, you will receive a

notification, and any transactions over the limit will be delayed for over 24 hours. You can, of course, authorize legitimate large transactions over the limit through the help of your Argent Guardians.

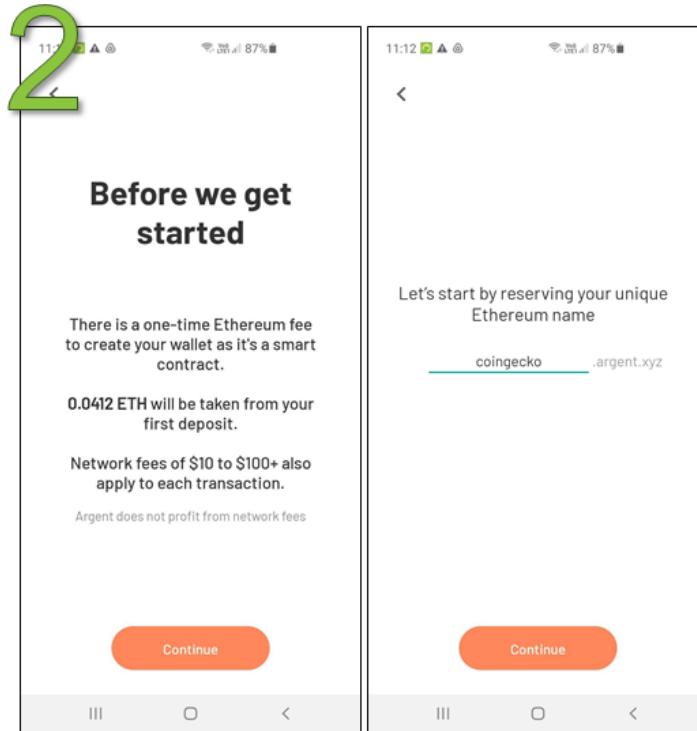
Argent requires a one-time Ethereum fee to create your wallet on the network. Network fees also apply to each transaction made through the app (Argent does not profit from the network fees). With Argent wallet, you can easily interact with DeFi Dapps directly from the wallet without the need to use another app or device.

Argent: Step-by-Step Guide



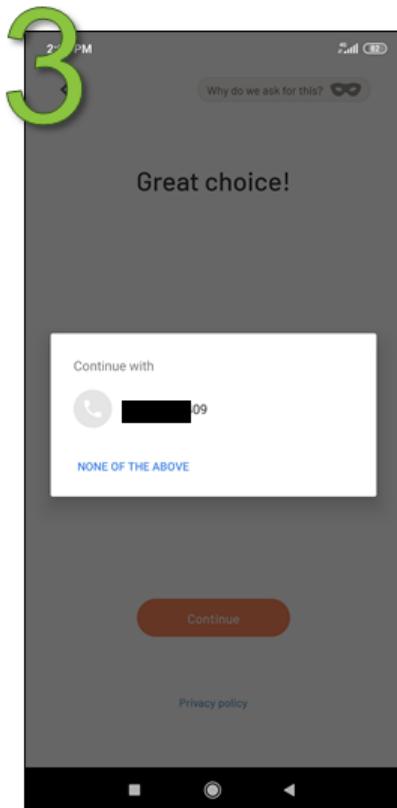
Step 1

- Go to <https://argent.link/coingecko>
- Download the app on your mobile phone



Step 2

- Once downloaded, Argent will inform you of Ethereum network charges that will be imposed later
- Choose a unique Ethereum name for your argent wallet



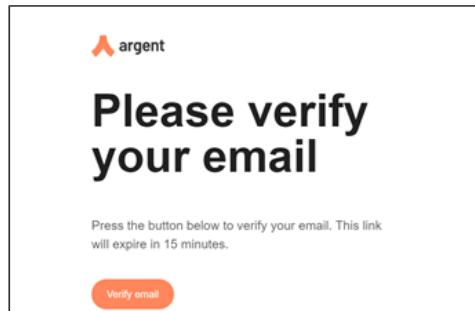
Step 3

- Argent will ask if you want to add your phone number for added security and verification purposes

4



And which email address should we use to notify you of important activity?

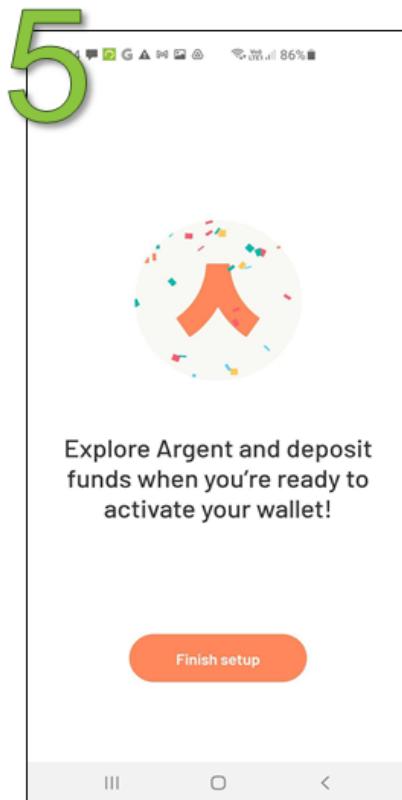


[Verify Email](#)

[Privacy policy](#)

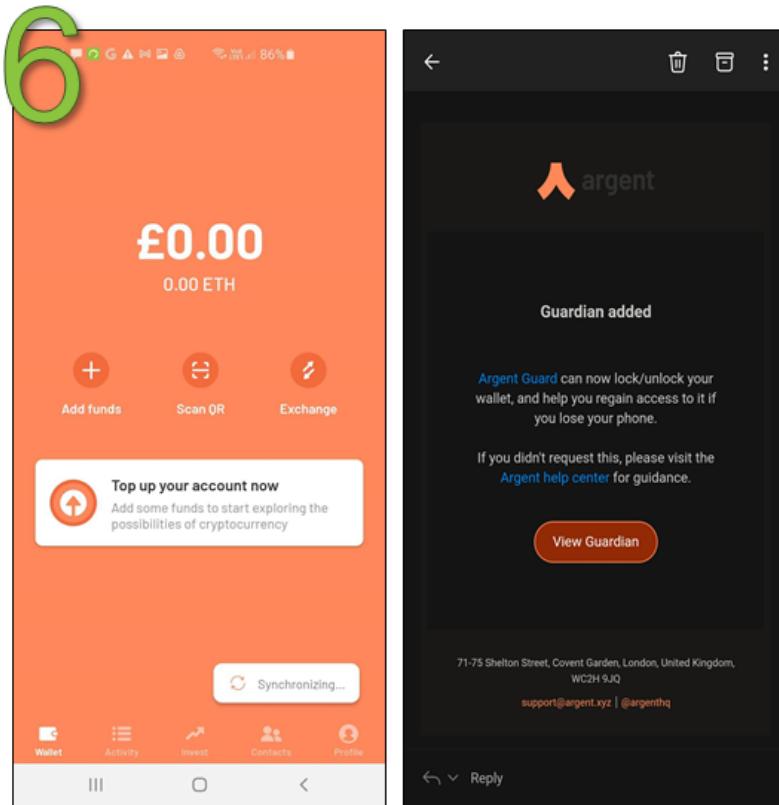
Step 4

- Afterward, Argent will ask for your email for verification purposes.



Step 5

- You will get an email notification once your wallet is ready to use!



Step 6

- You start depositing or sending cryptocurrencies to other people. Do consider adding additional Argent Guardians to improve your security.

Desktop Users: Metamask

For desktop users, you may use Metamask, a web browser extension available on Chrome, Firefox, Opera, and Brave browsers. Like Argent, Metamask is a non-custodial wallet and acts as both a wallet and an interaction bridge for the Ethereum network. It should be noted that Metamask also has an app for mobile phones. However, the app may have difficulties interacting with Dapps as some Dapps are not optimized for mobile devices.

You can store your Ethereum and ERC20 tokens on Metamask. Acting as an interaction bridge, Metamask enables you to use all Decentralized Applications (Dapps) hosted on the Ethereum Network.

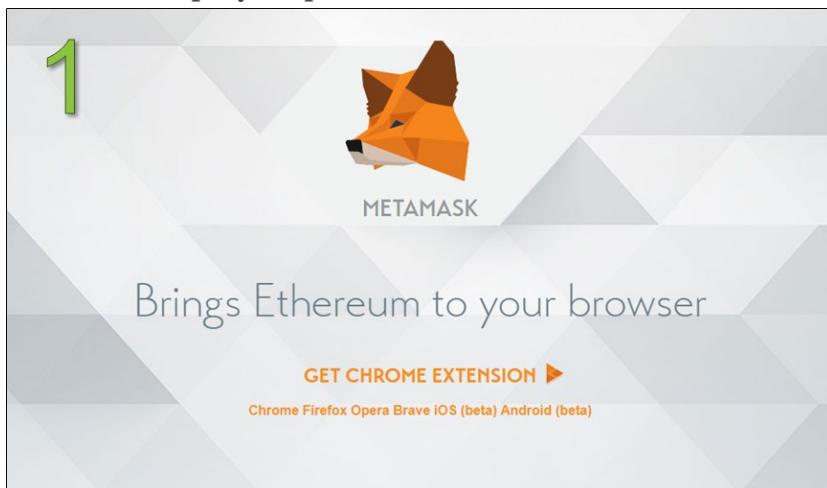
Without the use of an interaction bridge like MetaMask, your browser would not be able to access the Ethereum blockchain unless you were running a full Ethereum node and had the entire Ethereum blockchain of over 400GB downloaded on your computer. On a technical level, MetaMask does this by injecting a javascript library known as web3.js written by the core Ethereum developers into your browser's page to enable you to interact with the Ethereum network easily.

Metamask makes interaction with DeFi Dapps on the Ethereum network very convenient on your laptop or PC. They are secured to some degree as it requires you to sign each interaction and transaction you execute on the network. Metamask also has an in-built token swap feature, which allows you to exchange other tokens directly from the wallet.

However, it would be best if you took precautions to keep your Metamask safe and secure. Anybody who has your password or seed phrase (a secret phrase given to you during wallet sign-up) will have complete control of your wallet.

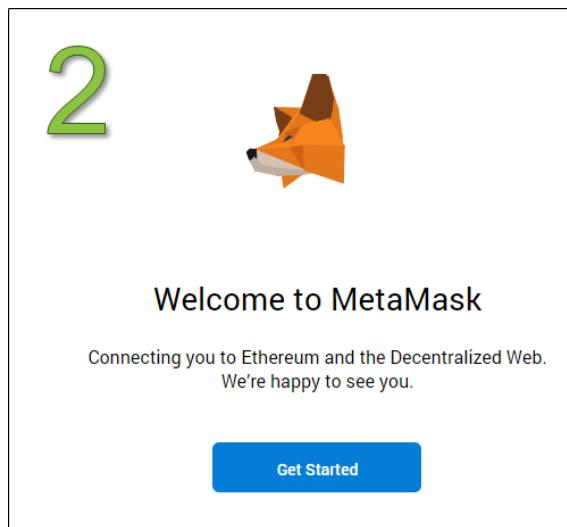
Most DeFi Dapps can be accessed using Metamask, and in the later chapters, you will notice that the step-by-step guides have been completed using Metamask.

Metamask: Step-by-Step Guide



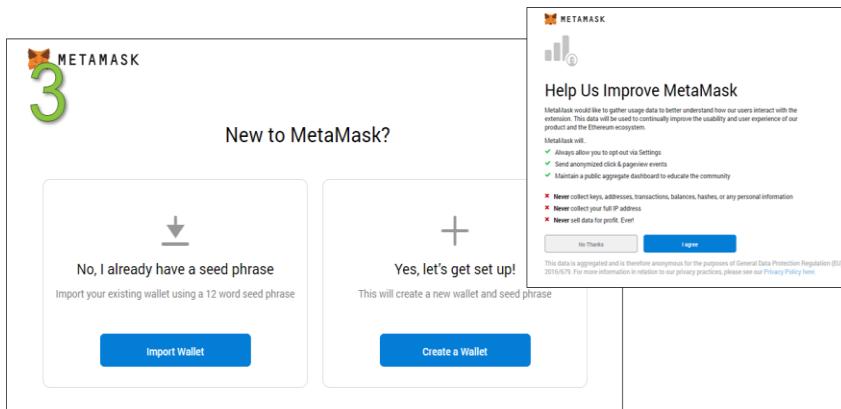
Step 1

- Go to <https://metamask.io/>
- Download extension for the browser of your choice



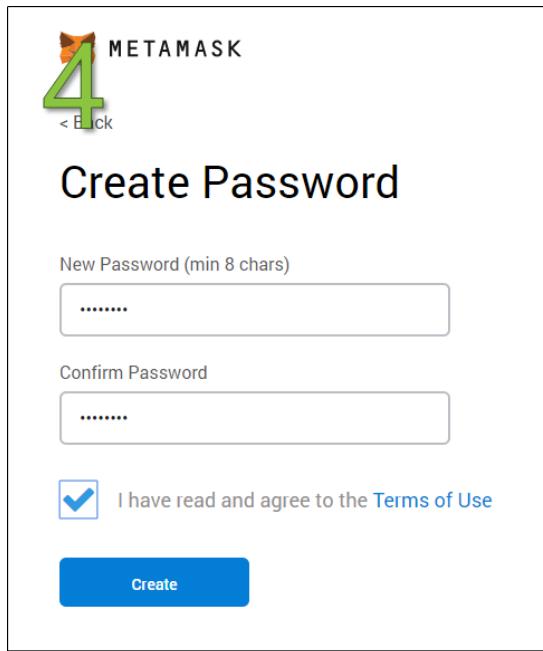
Step 2

- After you have downloaded the extension, click "Get Started"



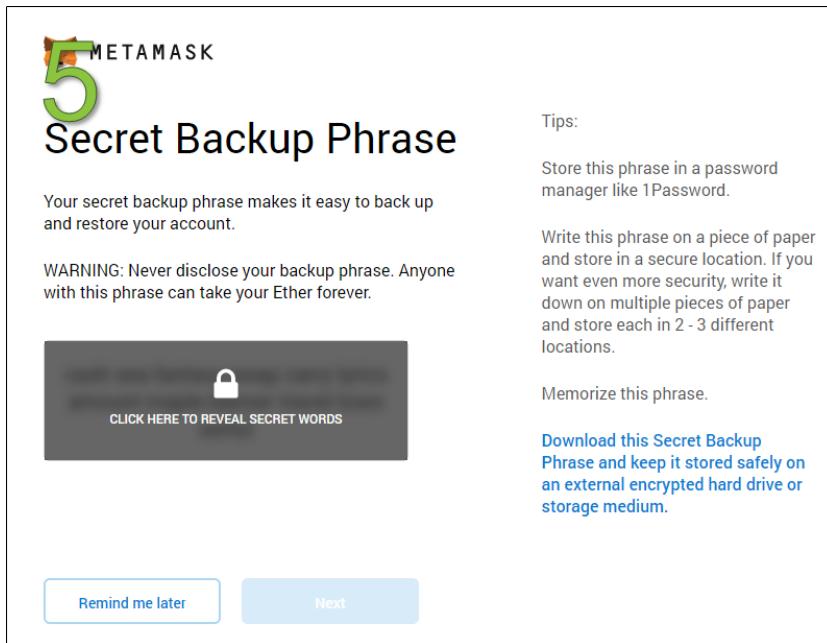
Step 3

- Click “Create a Wallet” and click “Next”.



Step 4

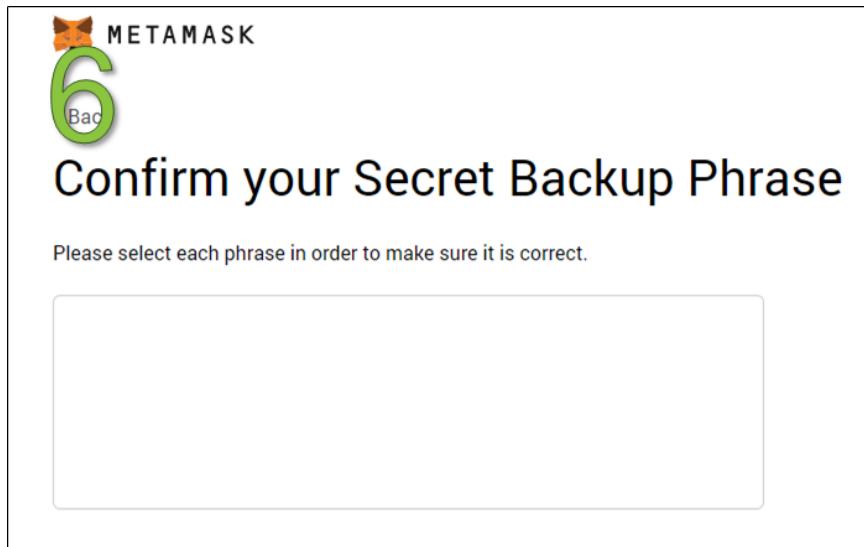
- Create your password.



The screenshot shows the MetaMask wallet interface for generating a secret backup phrase. At the top, the MetaMask logo is visible. Below it, the title "Secret Backup Phrase" is displayed. A sub-instruction states: "Your secret backup phrase makes it easy to back up and restore your account." A warning message follows: "WARNING: Never disclose your backup phrase. Anyone with this phrase can take your Ether forever." A large button with a lock icon and the text "CLICK HERE TO REVEAL SECRET WORDS" is centered. Below the button, there are two buttons: "Remind me later" and "Next". To the right of the main content, there is a "Tips:" section with three items: 1. "Store this phrase in a password manager like 1Password." 2. "Write this phrase on a piece of paper and store in a secure location. If you want even more security, write it down on multiple pieces of paper and store each in 2 - 3 different locations." 3. "Memorize this phrase." Below these tips is a blue link: "Download this Secret Backup Phrase and keep it stored safely on an external encrypted hard drive or storage medium."

Step 5 (IMPORTANT! READ CAREFULLY!)

- You will be given a Secret Backup Phrase
- NEVER lose it
- NEVER show it to anyone
- If you lose the phrase, you can't retrieve it
- If anyone else has it, they are able to access your wallet and do anything with it



Step 6

- You will be prompted to write the given secret backup phrase to confirm that you have noted it down



Congratulations

You passed the test - keep your seedphrase safe, it's your responsibility!

Tips on storing it safely

- Save a backup in multiple places.
- Never share the phrase with anyone.
- Be careful of phishing! MetaMask will never spontaneously ask for your seed phrase.
- If you need to back up your seed phrase again, you can find it in Settings -> Security.
- If you ever have questions or see something fishy, email support@metamask.io.

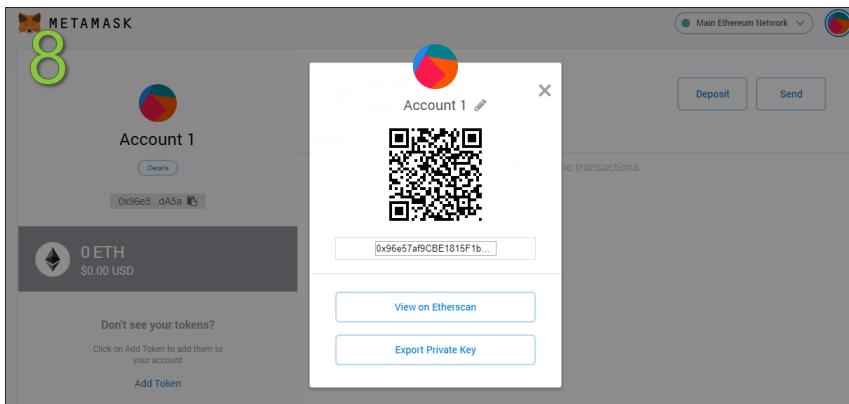
*MetaMask cannot recover your seedphrase. [Learn more.](#)

All Done

Step 7

- Congratulations! Your wallet is now created! You can use it to store Ethereum and ERC20 tokens

Ethereum Wallets



Step 8

- Below is your public key or your Ethereum address to your wallet
- Your QR code can be scanned if anyone wants to send you coins.

Recommended Readings

1. Argent: The quick start guide (Matthew Wright)
<https://medium.com/argenthq/argent-the-quick-start-guide-13541ce2b1fb>
2. A new era for crypto security (Itamar Lesuisse)
<https://medium.com/argenthq/a-new-era-for-crypto-security-57909a095ae3>
3. A Complete Beginner's Guide to Using MetaMask (Ian Lee)
<https://www.coingecko.com/buzz/complete-beginners-guide-to-metamask>
4. MyCrypto's Security Guide For Dummies And Smart People Too (Taylor Monahan) <https://medium.com/mycrypto/mycryptos-security-guide-for-dummies-and-smart-people-too-ab178299c82e>

PART THREE: DEEP DIVING INTO DEFI

CHAPTER 5: DECENTRALIZED STABLECOINS

The prices of cryptocurrencies are extremely volatile. In order to mitigate this volatility, stablecoins pegged to other stableassets such as the USD were created. Stablecoins help users hedge against this price volatility and allow for a reliable medium of exchange. Stablecoins have since quickly evolved to be a vital component of DeFi that is pivotal to this modular ecosystem.

There are 49 stablecoins currently listed on [CoinGecko](#). The top 5 stablecoins have a market capitalization totaling over \$59.8 billion.

Top 5 Cryptocurrency Stablecoins (1 April 2021)		
Rank	Bank	Market Cap. (\$ billion)
1	Tether (USDT)	40.8
2	USD Coin (USDC)	10.8
3	Binance USD (BUSD)	3.5
4	DAI (TUSD)	3.0
5	TerraUSD (USDT)	1.6

Source: CoinGecko.com

We will be looking into USD-pegged stablecoins in this chapter. Not all stablecoins are the same as they employ different mechanisms to keep their peg against USD. There are three types of stablecoins—flat-collateralized, crypto-collateralized, and algorithmic stablecoins. Most stablecoins use the flat-collateralized system to maintain their USD peg.

For simplicity, we will look at two USD stablecoins, Tether ([USDT](#)) and Dai ([DAI](#)) to showcase the differences in their pegging management. We will not be covering algorithmic stablecoins, a more recent DeFi innovation, in this book. If you are interested to learn more about algorithmic stablecoins, you can refer to our *How to DeFi: Advanced* book.

Tether ([USDT](#)) pegs itself to \$1 by maintaining reserves of \$1 per Tether token minted. While Tether is the largest and most widely used USD stablecoin with daily trading volumes averaging approximately \$113 billion in March 2021, Tether reserves are kept in financial institutions with little oversight, thus users will have to trust Tether as an entity to actually have the reserve amounts that they claim. Tether is therefore a **centralized, fiat-collateralized stablecoin**.

On the other hand, DAI ([DAI](#)) is collateralized using cryptocurrencies such as Ethereum ([ETH](#)). Its value is pegged to \$1 through protocols voted on by a decentralized autonomous organization and smart contracts. At any given time, users can easily validate that the collateral used to generate DAI exists. DAI is thus a **decentralized, crypto-collateralized stablecoin**.

Based on the top 5 stablecoins' market capitalization, Tether dominates the stablecoin market with approximately 68% of the market share. Although DAI's market share only stands at about 5%, its trading volume has been increasing at a much faster rate. DAI's trading volume increased by over 158% relative to Tether's growth of 95% throughout Q1 2021.

DAI is the native stablecoin used most widely in the DeFi ecosystem. It is one of the preferred USD stablecoin used in DeFi trading, lending, and more. To understand DAI further, we will introduce you to its platform, Maker.

Maker



What is Maker?

Maker is a smart-contract platform that runs on the Ethereum blockchain and **has two tokens**: DAI (both algorithmically pegged to \$1) and its governance token—Maker ([MKR](#)).

Dai (DAI) was launched in November 2019 and is also known as Multi-Collateral DAI. It is currently backed by a basket of third-party assets such as Ether (ETH), Basic Attention Token (BAT), USDC and Wrapped Bitcoin (wBTC). More types of collateral are continuously added based on community proposals.

Maker (MKR) is Maker's governance token, and users can use it to vote for improvements on the Maker platform via the Maker Improvement Proposals. Maker is a type of organization known as a Decentralized Autonomous Organization (DAO). We will look further into this under the governance subsection.

What are the Differences between SAI and DAI?

Maker initially started out on [19 December 2017](#) with the Single Collateral DAI. It was minted using Ether ([ETH](#)) as the sole collateral. On [18 November 2019](#), Maker announced the launch of the new Multi-Collateral DAI, which can be minted using either Ether ([ETH](#)) and/or Basic Attention Token ([BAT](#)) as collateral.

In March 2020, Maker introduced its first centralized-back collateral USDC to help manage its liquidity crisis and DAI price instability during the Black Thursday crash. Currently, users are able to submit proposals at [MakerDAO's forum](#) where the community will evaluate and decide on onboarding new collateral types.

To reiterate,

Single-Collateral DAI = Legacy DAI = SAI

Multi-Collateral DAI = New DAI = DAI

SAI has already since been phased out and Multi-Collateral DAI is currently the de-facto stablecoin standard maintained by Maker.

How does Maker Govern the System?

Recall our brief mention of Decentralized Autonomous Organization (DAO)? That's where the Maker (MKR) token comes in - MKR holders have voting rights proportional to the amount of MKR tokens they own in the DAO and can vote on parameters governing the Maker Protocol.

The parameters that the MKR holders vote on are vital in keeping the ecosystem healthy, which in turn helps ensure that DAI remains pegged to \$1. We will briefly go through three key parameters which you will need to know in the DAI stablecoin ecosystem:

I. Collateral Ratio

The amount of DAI that can be minted is dependent on the collateral ratio.

For example:

Wrapped Bitcoin (wBTC) collateral ratio = 150%

Basic Attention Token (BAT) collateral ratio = 150%

Therefore, a collateral ratio of 150% means that in order to mint \$100, you need to deposit a minimum of \$150 worth of wBTC or BAT.

II. Stability Fee

It is equivalent to the 'interest rate' which you are required to pay along with the principal debt of the vault. The stability fee for each Vault type changes as a result of the decisions of MKR token holders who govern

the protocol. These decisions are based on the recommendation of Maker's internal risk teams who perform risk assessments on collaterals used in the system. For example, the current [stability fee for BAT is 6.0%](#) as of April 2021.

III. DAI Savings Rate (DSR)

The DAI Savings Rate (DSR) is the interest earned by holding DAI over time. It also acts as a monetary tool to influence the demand of DAI. The [DSR rate is set at 0.01%](#) as of April 2021.

Motivations to Issue DAI:

Why would you want to lock up a higher value of collateral such as ETH only to issue DAI with a lower value? You could have sold your assets directly to USD instead.

There are three possible cases:

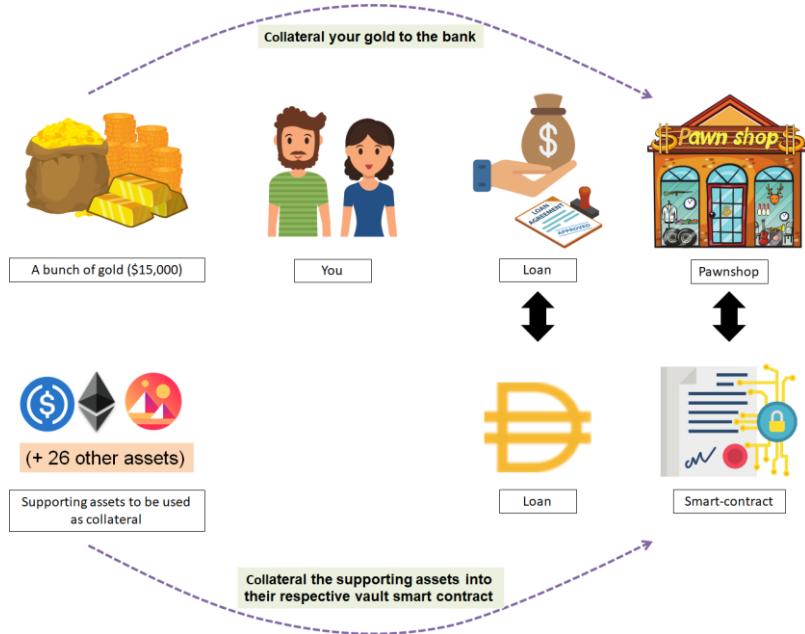
- I. You need cash now and you have an asset that you believe will be worth more in the future.
 - In this case, you could hold your asset in the Maker vault and get the money now by issuing DAI.
- II. You need cash now but do not want to risk triggering a taxable event when selling your asset.
 - Instead, you will draw the loans by issuing DAI.
- III. Investment Leverage
 - You are able to conduct investment leverage on your assets given that you believe the value of your assets would go up.

How do I get my hands on some Dai (DAI)?

There are two ways you can get your hands on some Dai (DAI):

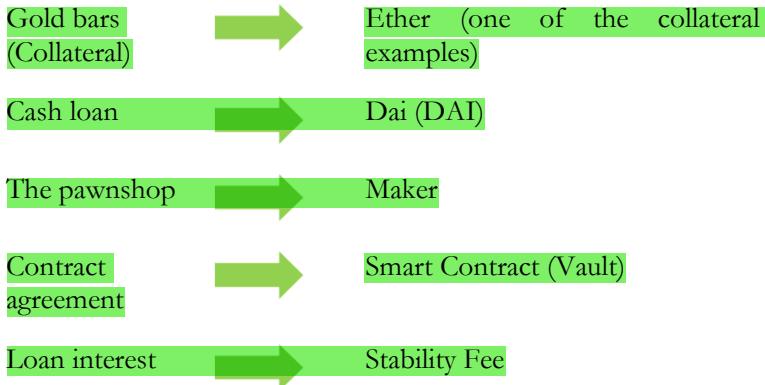
1. Minting DAI

We will walk through how DAI can be minted using a pawnshop analogy.



Let's assume that one day you are in need of \$10,000 cash, but all you have are gold bars worth \$15,000 at home. Believing that the price of gold will increase in the future, instead of selling the gold bars for cash, you decide to go to a pawnshop to borrow \$10,000 cash by putting your gold bars as collateral for it. The pawnshop agrees to lend you \$10,000 with an interest of 8% for the cash loan. Both of you sign a contract agreement to finalize the transaction.

Now let's change the terminology to get the narrative of DAI:



What happens is that you will mint or 'borrow' DAI via the Maker platform by putting your Ether (ETH) as collateral. You will have to repay your 'loan' along with the 'loan interest' which is the stability fee when you want to redeem your ETH at the end of your loan.

To provide an overview, let's walk through how you can mint your own DAI.

On the Maker platform (www.oasis.app), you can borrow DAI by putting your ETH into the vault. Assuming ETH is currently worth \$150, you can thus lock 1 ETH into the vault and receive a maximum of 100 DAI (\$100) with a 150% collateral ratio. There are currently three types of vaults for ETH with different collateral ratios, but for the sake of simplicity, we will assume that the collateral ratio is 150%, which is the ETH-A vault.

You should not draw out the maximum of 100 DAI that you are allowed to but leave some buffer in the event that ETH price decreases. It is advisable to give a wider gap to ensure your collateral ratio always remains above 150%. This ensures that your vault will not be liquidated and charged the 13% liquidation penalty in the event that ETH falls in price and your collateral ratio falls below 150%.

2. Trading DAI

The above methods are all the ways DAI is created. Once DAI is created, you can send it anywhere you want. Some users may send their DAI to cryptocurrency exchanges. You may also buy DAI from these secondary markets without the need to mint them.

Buying DAI this way is easier as you do not need to lock up collateral and do not have to worry about the collateral ratio and stability fee.

We will keep this section brief - you can check out CoinGecko for the [list of exchanges](#) that trades DAI.

Black Swan Event



A black swan event is an unpredictable and extreme event that may cause severe consequences. In the case where Maker's collateral has a significant drop in price, an Emergency Shutdown will be triggered. It is a process used as a last resort to settle the Maker Platform by shutting the system down. The process is to ensure the holders of DAI holders and Vault users receive the net value of assets they are entitled to.

In March 2020 (also known as Black Thursday), an Emergency Shutdown was almost triggered, where the price of ETH dropped by 50% within 24 hours. Maker mitigated the impact through its automated debt auction (despite its late trigger due to the sharp drop) and quickly introduced USDC as a new collateral type to back the system.

Why use Maker?

As previously mentioned in Section 2: Stablecoins, there are many stablecoins, and the core distinctions of these stablecoins lie in their protocol. Unlike most stablecoin platforms, Maker is fully operating on the distributed ledger. Thus, Maker inherently possesses the characteristics of the blockchain: secured, immutable, and most importantly, transparent.

Additionally, Maker's infrastructures have strengthened the system's security with comprehensive risk protocols and mechanisms via real-time information.

And that's it for **Makers' Stablecoin, DAI**. If you're keen to get started or test it out, we've included step-by-step guides on how to (i) mint some DAI for yourself and (ii) save DAI to earn interest. Otherwise, head on to the next section to read more on the next DeFi app!

Maker: Step-by-Step Guides

Minting your own DAI

The screenshot shows the homepage of the Oasis app. At the top left is a large green number '1'. At the top right is a 'Start now' button and a 'Learn about Dai' link. In the top right corner, there is a 'Open Oasis →' link. On the right side of the screen, there is a 'Savings' section showing two boxes: one for DAI with 812.41 and 0.88% APY, and another for ETH with 412.4 and 0.48% APY. Below that is a 'Balances' section showing DAI with 541.77 and \$541.645, and ETH with 5.42 ETH and \$5841.645. There is a 'Buy Dai' button. The main content area has two columns. The left column is titled 'Dai tracks USD' and 'Send Dai, instantly'. The right column is titled 'Grow your savings' and 'You're in complete control'. At the bottom, there is a 'Borrow' button highlighted with a red circle and a red arrow pointing to it. Other buttons at the bottom include 'Trade', 'Privacy', 'Terms', 'Blog', 'FAQ', 'Contact', and 'English ▾'.

Step 1

- Go to <https://oasis.app/>
- Click Borrow
- You will be asked to connect your wallet. Connecting your wallet is free, all you need to do is sign a transaction

2

SELECT COLLATERAL VAULT MANAGEMENT GENERATE DAI CONFIRMATION

Select a collateral type

Each collateral type has its own risk parameters. You can lock up additional collateral types later.

COLLATERAL TYPE	STABILITY FEE	LIQ RATIO	LIQ FEE	YOUR BALANCE
<input checked="" type="radio"/> ETH-A	8.000 %	150 %	13.00 %	0.106 ETH
<input type="radio"/> BAT-A	8.000 %	150 %	13.00 %	0 BAT

Choose which coins you want to collateralize to borrow Dai.

Note: Only one type of coins at a time to borrow Dai.

Back Continue

Stability Fee
The fee calculated based on the outstanding debt of your Vault. This is continuously added to your existing debt.

Liquidation Ratio
The collateral-to-dai ratio at which the Vault becomes vulnerable to liquidation.

Liquidation Fee
The fee that is added to the total outstanding DAI debt when a liquidation occurs.

Step 2

- Click “Start Borrow” on the borrow page (<https://oasis.app/borrow/>)
- Choose which cryptoasset you want to lock-in (collateralize)

3

Deposit ETH and Generate Dai

Different collateral types have different risk parameters and collateralization ratios.

How much ETH would you like to lock in your Vault?

The amount of ETH you lock up determines how much Dai you can generate.

0.2 ETH

YOUR BALANCE 0.203 ETH

How much Dai would you like to generate?

Generate an amount that is safely above the liquidation ratio.

21 DAI

MAX AVAIL TO GENERATE 32.5 DAI

Note: Minimum amount you could generate is 20 DAI

Your Collateralization Ratio 232.20% (Min 150%)

Your Liquidation Price \$157.50

Current ETH Price \$243.81

Stability Fee 8.000%

Max amount of Dai you could generate

Continue

Step 3

- In this example, we chose to lock-in ETH
- Insert any amount you wish to lock. Note: The minimum amount of borrowing is 20 DAI
- Click Continue and follow the instructions provided

4

ETH-A Vault #4807

Liquidation price	Collateralization ratio	
195.19 USD (ETH/USD)	187.36 %	
Current price information (ETH/USD)	Minimum ratio	
243.81 USD	150.00%	
Liquidation penalty	Stability fee	
13.00%	8.0000%	
ETH locked	Outstanding Dai debt	
ETH locked	Outstanding Dai debt	
0.2000 ETH 48.78 USD	26.83 DAI Pay back	
Able to withdraw	Available to generate	
0.0399 ETH 9.72 USD	6.48 DAI Generate	
Vault history		
ACTIVITY	DATE	TX HASH
Generated 6.48 new Dai from Vault	Feb 12, 2020, 11:14:32 AM	0x105...004187 ↗
Generated 20.00 new Dai from Vault	Feb 6, 2020, 7:02:22 PM	0x625...4074631 ↗
Deposited 0.2000 ETH into Vault	Feb 6, 2020, 7:02:22 PM	0x625...4074631 ↗
Opened a new Vault with id #4807	Feb 6, 2020, 7:02:22 PM	0x625...4074631 ↗

Step 4

- Congratulations! Your ETH vault is now created!

In addition to minting DAI, you can also save on Maker's platform to earn interest on your assets. We've prepared a step-by-step guide on how to save your DAI below:

Saving your DAI

1

Save

Borrow

Overview

ETH-A 232%

ETH-A 187%

+

Trade

Overview

TOTAL COLLATERAL LOCKED
\$97.52 USD

TOTAL DAI DEBT
47.03 DAI

Your Vaults

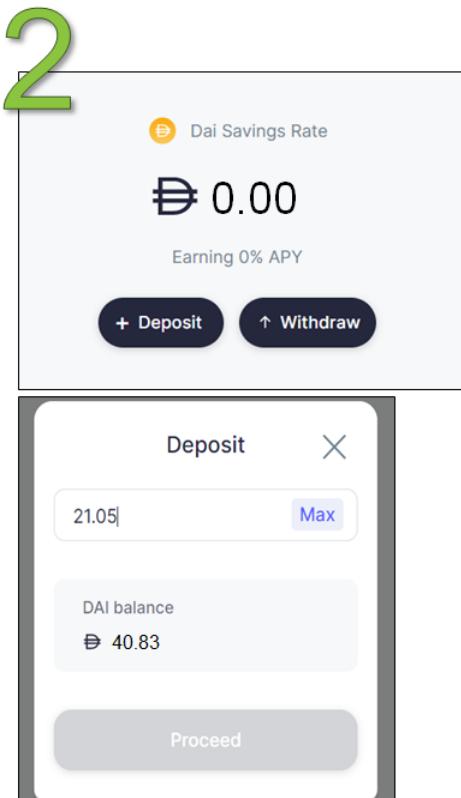
TOKEN	Vault ID	CURRENT RATIO	DEPOSITED	AVAIL. TO WITHDRAW	DAI
ETH	5179	232.20%	0.20 ETH	0.07 ETH	21.00 DAI
ETH	4807	187.36%	0.20 ETH	0.04 ETH	26.03 DAI

Manage Vault

Manage Vault

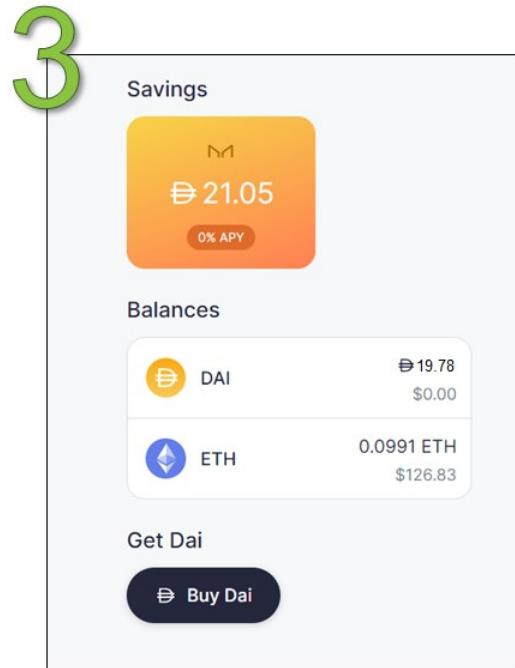
Step 1

- Navigate to the Save page on the left sidebar (<https://oasis.app/save>)



Step 2

- Click “Deposit”
- Enter the amount of DAI you wish to save
- Click “Proceed”
- Confirm in wallet



Step 3

- And it's done!
- Note: You only have one DSR account. If you were to deposit more DAI after your first deposit, it will be added to it.
- Kindly note at the time of writing (April 2021), the DSR has 0% APY.

Recommended Readings

1. Maker Protocol 101 (Maker) <https://docs.makerdao.com/maker-protocol-101>
2. Maker for Dummies: A Plain English Explanation of the Dai Stablecoin (Gregory DiPrisco)
<https://medium.com/cryptolinks/maker-for-dummies-a-plain-english-explanation-of-the-dai-stablecoin-e4481d79b90>
3. What's MakerDAO and what's going on with it? Explained with pictures. (Kerman Kohli) <https://hackernoon.com/whats-makerdao-and-what-s-going-on-with-it-explained-with-pictures-f7ebf774e9c2>
4. How to get a DAI saving account (Ryan Sean Adams)
<https://bankless.substack.com/p/how-to-get-a-dai-saving-account>
5. Maker's Black Swan Event
<https://tokentuesdays.substack.com/p/makers-black-swan>

CHAPTER 6: DECENTRALIZED LENDING AND BORROWING

One of the biggest services offered by the financial industry is the lending and borrowing of funds, which was made possible by the concept of credit and collateralization. As of 1 April 2021, the borrowing volume increased 102 times more than a year ago, reaching \$9.7 billion.

It can be argued that the invention of commercial-scale lending and borrowing was what brought about the Renaissance age as the possibility for the less wealthy to acquire startup funds led to a flurry of economic activity. Thus, the economy began to grow at an unprecedented pace.

Entrepreneurs can borrow the upfront capital needed to establish a business by collateralizing the company. Families can get a mortgage for a house that would otherwise be too costly to buy in cash by using the house as collateral. On the other hand, the wealth accumulated can be lent out as capital to borrowers. This system reduces the risk of borrowers absconding with the borrowed funds.

However, this system requires some form of trust and an intermediary. Banks have historically taken up an intermediary role while a convoluted credit system maintains trust. In this credit system, borrowers must exhibit the ability to repay the loan to be qualified to borrow, among a laundry list of other qualifications and requirements by the banks.

This has led to various challenges and shortfalls of the current lending and borrowing system, such as restrictive funding criteria, geographical or legal restrictions to access banks, high barriers to loan acceptance, and the exclusivity of only the wealthy to enjoy the benefits of low-risk high-returns lending.

In the DeFi landscape, such barriers do not exist as banks are no longer necessary. With enough collateral, anyone can have access to capital to do whatever they want. Capital lending is also no longer enjoyed only by the wealthy; everyone can contribute to a decentralized liquidity pool that borrowers can take from and pay back at an **algorithmically-determined interest rate**. In contrast to applying for a loan from the bank where there are stringent Know-your-customer (KYC) and Anti-money laundering (AML) policies, one only needs to provide collateral to take a loan in DeFi.

We will explore how such bankless lending and borrowing mechanisms are possible with Compound Finance and Aave, the two leading DeFi lending and borrowing protocols.

Compound



Compound Finance is an Ethereum-based, open-source money market protocol where anyone can lend or borrow cryptocurrencies frictionlessly. As of 1 April 2021, there are nine different tokens available on the Compound Platform:

1. [0x \(ZRX\)](#)
2. [Basic Attention Token \(BAT\)](#)
3. [Compound \(COMP\)](#)

4. [Dai \(DAI\)](#)
5. [Ether \(ETH\)](#)
6. [USD Coin \(USDC\)](#)
7. [Tether \(USDT\)](#)
8. [Uniswap \(UNI\)](#)
9. [Wrapped Bitcoin \(WBTC\)](#)

Do note that USDT is the only token that cannot be used as collateral because its fee structure could potentially impact Compound's liquidity mechanism.

Compound operates as a liquidity pool built on the Ethereum blockchain. Suppliers supply assets to the liquidity pool to earn interest, while borrowers take a loan from the liquidity pool and pay interest on their debt. In essence, Compound bridges the gaps between lenders who wish to accrue interest from idle funds and borrowers who want to borrow funds for productive or investment use.

In Compound, interest rates are denoted in Annual Percentage Yield (APY), and the interest rates differ between assets. Compound derives the interest rates via algorithms that take into account the supply and demand of the assets.

Essentially, Compound lowers the friction for lending/borrowing by allowing suppliers/borrowers to interact directly with the protocol for interest rates without needing to negotiate loan terms (e.g., maturity, interest rate, counterparty, collaterals), thereby creating a more efficient money market.

How much interest will you receive, or pay?

The [Annual Percentage Yield \(APY\)](#) differs between assets as it is algorithmically set based on the supply and demand of the various assets. Generally, the higher the borrowing demand, the higher the interest rate (APY) and vice versa.

Decentralized Lending and Borrowing

All Markets					
Market		Total Supply	Supply APY	Total Borrow	Borrow APY
 Ether	ETH	\$1,571.72M -0.38%	0.13% -	\$96.19M -0.45%	2.65% -
 Dai	DAI	\$1,290.69M -1.19%	4.45% +0.34	\$1,059.12M -0.69%	6.44% +0.47
 Wrapped BTC	WBTC	\$1,145.97M -0.29%	0.21% +0.01	\$74.84M +1.95%	4.04% +0.04
 USD Coin	USDC	\$1,026.58M +1.35%	7.80% +1.45	\$873.43M +3.12%	10.01% +1.72
 Tether	USDT	\$178.70M +118%	8.01% +0.80	\$152.41M +2.14%	10.26% +0.94
 Uniswap	UNI	\$132.56M +0.15%	0.20% +0.01	\$8.33M +5.02%	4.29% +0.11
 0x	ZRX	\$78.30M +0.10%	2.58% -	\$23.98M +0.03%	11.74% -0.01
 Compound Governance Token	COMP	\$60.05M +3.65%	2.92% -0.20	\$22.29M -	10.90% -0.34
 Basic Attention Token	BAT	\$28.94M +0.46%	2.43% -0.01	\$8.67M +0.34%	11.26% -0.01

<https://compound.finance/markets>

Using the DAI stablecoin as an example, a lender would earn 4.45% APY (as of January 2021) in a year, while a borrower would be paying 6.44% APY interest after a year.

Do I need to register for an account to start using Compound?

No, you do not need to register for an account, and that's the beauty of Decentralized Finance applications! Unlike traditional financial applications where users must go through lengthy processes to get started, Compound users do not need to register for anything.

Anyone with a supported cryptocurrency wallet such as Argent and Metamask can start using Compound immediately.

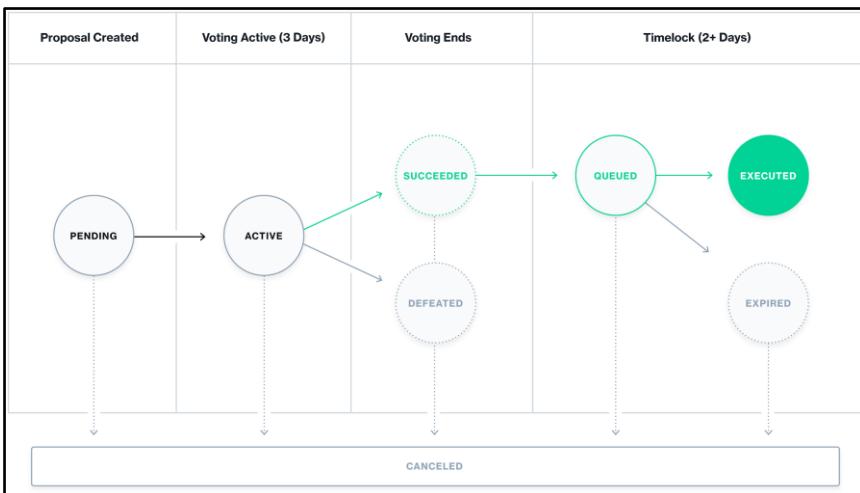
Compound Governance

Compound became progressively decentralized since its inception and has transitioned into a fully community-powered protocol via the introduction of the COMP governance token in June 2020. COMP holders can suggest,

debate, and implement changes to Compound via voting on [Compound's voting dApp](#). For more information on governance tokens, refer to [Chapter 13](#).

Examples of changes that governance can make to the Compound protocol include the addition of new assets or system parameter adjustments such as collateral factors or interest rate algorithms.

How does Compound Governance work?



There are three core components in governing the Compound protocol:

1. COMP token
2. Governance module (Governance Alpha)
3. Timelock

To table a governance proposal, an address (known as a delegate) must have more than 1% of the total COMP supply of 10,000,000 delegated to it (100,000 COMP). This stage is known as Governor Alpha.

Once submitted, there is a 3-day voting period where a minimum of 400,000 votes must be received by COMP token holders (the quorum is 4% of the total COMP supply).

Once a minimum threshold of votes has been received, passed proposals will be queued in the Timelock. There will be a 2-day grace period before passed proposals are implemented into the Compound protocol.

Users can obtain COMP tokens by buying them off the secondary markets or yield farming the COMP tokens by lending or borrowing on the Compound protocol. **COMP tokens are distributed on a pro-rata basis based on the interest rates of lending and borrowing activity on Compound.**

Start earning interest on Compound

To earn interest, you will have to supply assets to the protocol. As of January 2021, Compound accepts nine types of tokens.

Once you have deposited your assets into Compound, you will immediately begin to earn interest on your deposits. Interest is accrued on the amount supplied and calculated after each Ethereum block (average ~15 seconds).

Upon deposit, you will receive corresponding amounts of cTokens. If you supply DAI, you will receive cDAI, if you supply Ether, you will receive cETH, and so on. Interest is not immediately distributed but instead accrues on the cTokens, and is redeemable for the underlying asset and interest it represents.

Note: USDT is the only asset that cannot be used as collateral because of the counterparty exposure risk. As mentioned in [Chapter 2](#), users will need to trust that every USDT is fully backed 1:1 with USD and the reserve exists. Compound fears that an infinite quantity of USDT could be minted to drain assets from the protocol.²

What are cTokens?

cTokens represent your balance in the protocol and accrue interest over time. In Compound, interest earned is not distributed immediately but instead accrues in cTokens.

² (n.d.). CoinGecko. Retrieved March 23, 2021, from

<https://discord.com/channels/402910780124561410/765610989847969810/790721926372261890>

Let's go through this with an example. Assume that you have supplied 1,000 DAI on 1 January 2020, and APY has been constant at 10% throughout 2020.

On 1 January 2020, after you have deposited 1,000 DAI, you will be given 1,000 cDAI. In this case, the exchange rate between DAI and cDAI is 1:1.

On 1 January 2021, after one year, your 1,000 cDAI will now increase in value by 10%. The new exchange rate between DAI and cDAI is 1:1.1. Your 1,000 cDAI is now redeemable for 1,100 DAI.

1 Jan 2020: Deposit 1,000 DAI. Receive 1,000 cDAI. Exchange Rate:
1 cDAI = 1 DAI

1 Jan 2021: Redeem 1,000 cDAI. Receive 1,100 DAI. Exchange Rate:
1 cDAI = 1.1 DAI (cDAI value increased by 10%)

To account for the interest accrued, cTokens become convertible into an increasing amount of the underlying asset it represents over time. cTokens are also ERC-20 tokens, meaning you can easily transfer the “ownership” of supplied assets if someone wants to take over your position as a supplier.

Start borrowing on Compound

Before borrowing, you have to supply assets into the system as collateral for your loan. The more assets that you supply into Compound, the greater the amount that you can borrow. Additionally, each asset supplied has a different collateral factor that determines the amount you can borrow.

Borrowed assets are sent directly to your Ethereum wallet, and from there, you can use them as you would any cryptoasset—anything your financial strategy desires!

Do note that a portion of the interest paid by the borrower will go to its reserve - which acts as the insurance and is controlled by the Compound token (COMP) holders. Each supported asset has its reserve factor that will determine how much goes into the reserve.

Price movement of collateral asset

If you are thinking about depositing your assets as collateral to take a loan, you may wonder what happens if the value of the collateral changes? Let's see:

1. Collateral value moves up

If the value of the asset you used as collateral goes up, your collateral ratio also goes up, which is fine—nothing will happen, and you can draw a bigger loan if you would like to.

2. Collateral value moves down

On the other hand, if the collateral goes down such that your collateral ratio is now below the required collateral ratio, your collateral will be partially sold off along with an 8% liquidation fee. **The process of selling off your collateral to achieve the minimum collateral ratio is known as liquidation.**

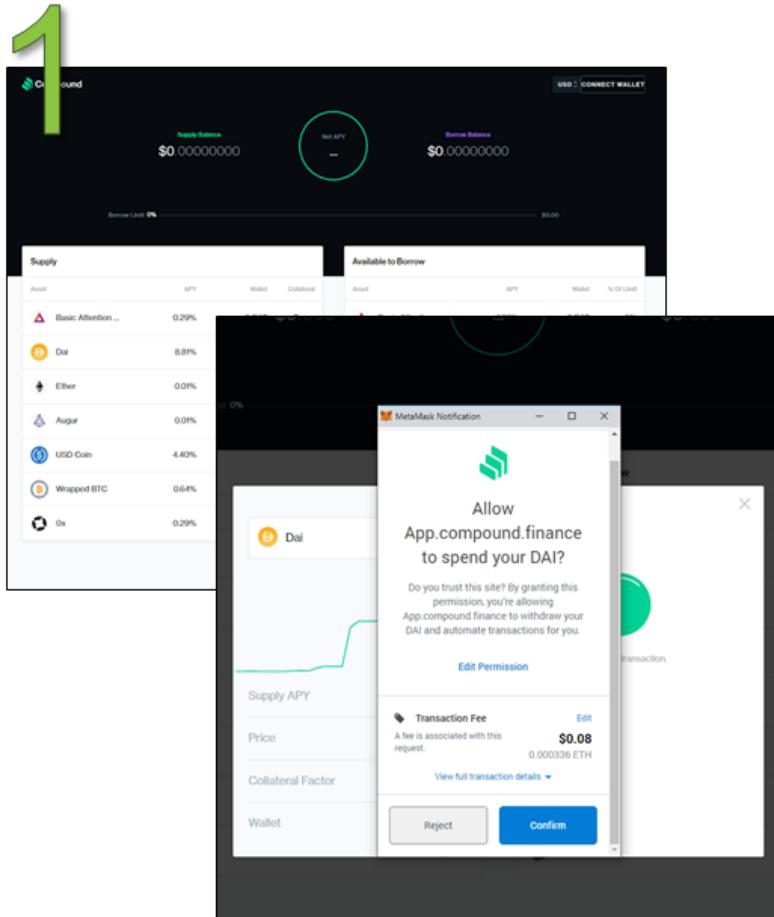
Liquidation

Liquidation occurs when the value of the collateral provided is less than the borrowed funds. Liquidation happens to ensure that there will always be excess liquidity for withdrawal and borrowing of funds, protecting lenders against default risk. **The current liquidation fee is 8%.**

And that's it for Compound—if you're keen to get started or test it out, we have included step-by-step guides on how to (i) supply funds to the pool and (ii) borrow from the pool. Otherwise, head on to the next section to read more on the next DeFi Dapp!

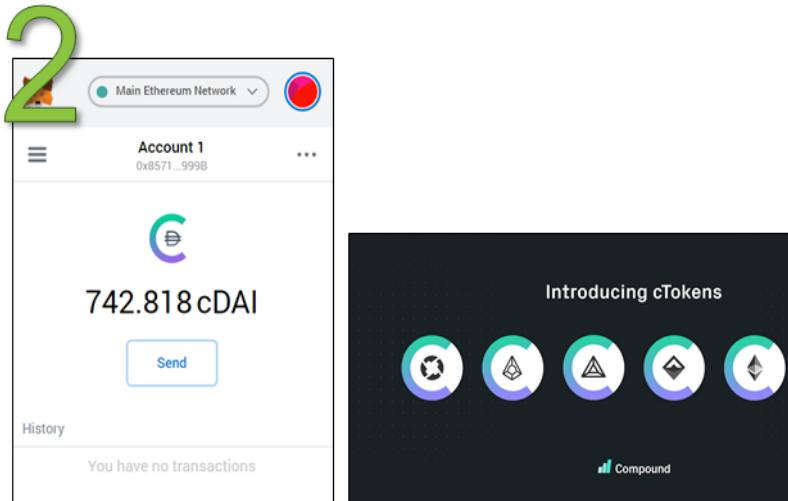
Compound.Finance: Step-by-Step Guides

Supplying funds to the pool:



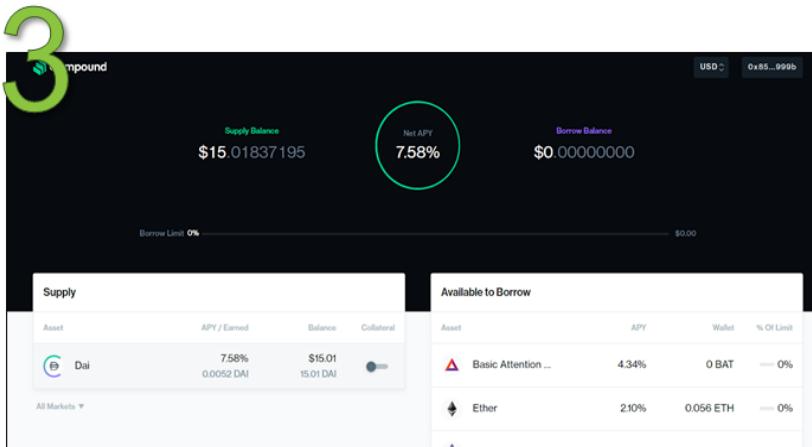
Step 1

- Head over to <https://app.compound.finance>
- Connect your wallet. Follow your wallet's instructions
- Deposit cryptocurrencies into the liquidity pool (any of the 9 tokens)



Step 2

- Receive cTokens
- When you sign up for a fixed deposit, the bank will issue a fixed deposit certificate as proof of placement. Similarly, after supplying assets, you will get cTokens which represent the type and amount of assets you have deposited
- The cTokens act as a claim of deposit and record the interest you earn. Likewise, you have to use it to redeem or withdraw your assets



Step 3

- Earn Interest
- You start to earn interest the moment you deposit assets and receive cTokens in return. By holding the cTokens, the interest will accrue on your account.

Step 4

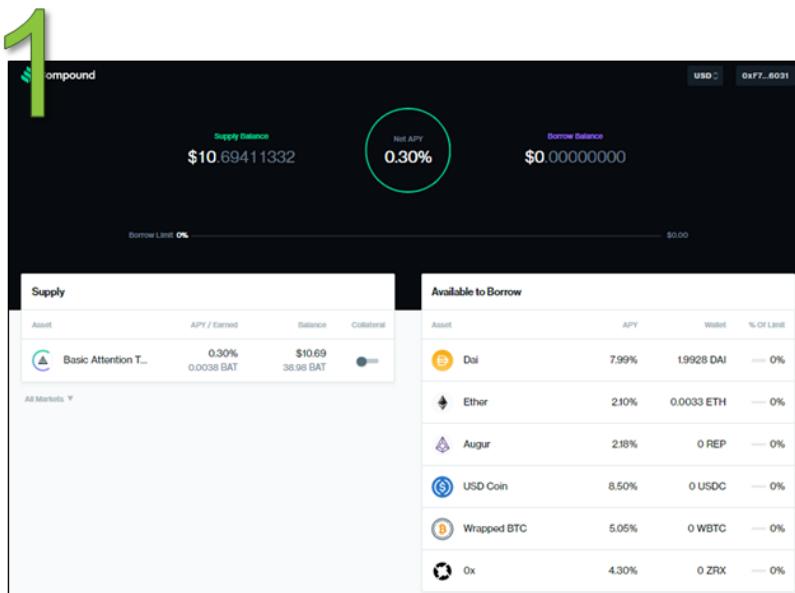
- Redeem cToken
- Over time, the interest accumulates and each cTokens is convertible into a greater value of underlying assets. You can redeem the cTokens anytime and receive the assets back to your wallet instantly.

Decentralized Lending and Borrowing

Borrowing funds from the pool:

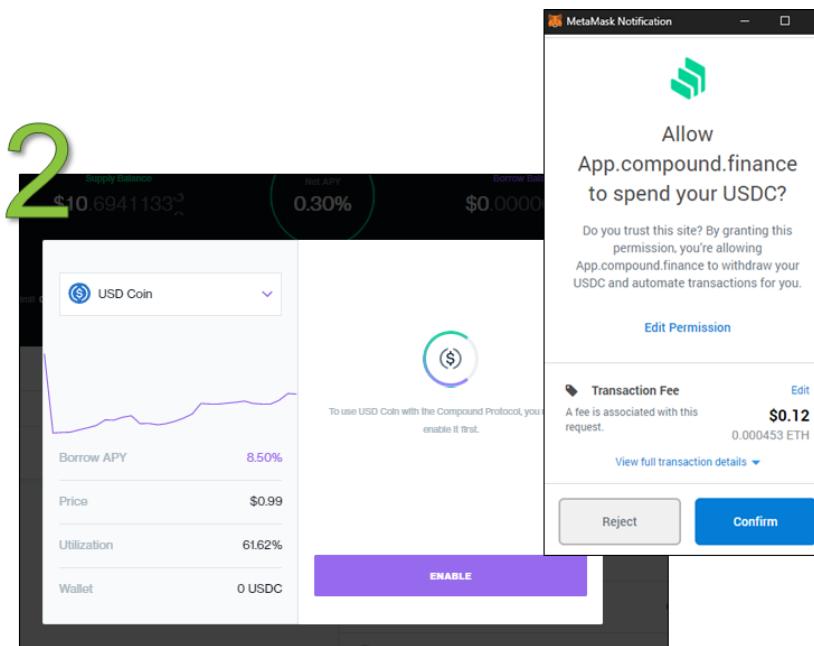
Note:

- Before you could start borrowing, you are required to supply some assets into the compound as a form of collateral. USDT cannot be used as collateral for borrowing funds.
- Each token has its own collateral factor. A collateral factor is the ratio of how much you have to supply in order to borrow.
- You cannot supply and borrow the same token at the same time



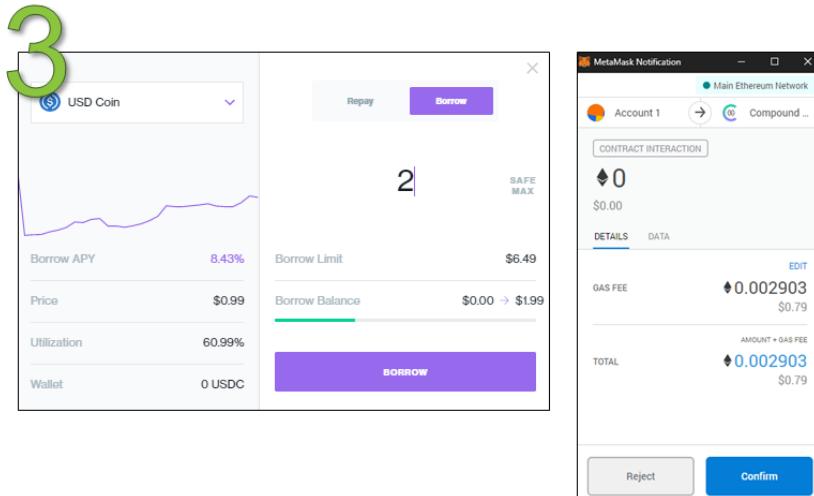
Step 1

- Go to the Compound's main page <https://app.compound.finance/>
- Choose which tokens you wish to borrow on the right bar. We chose USDC



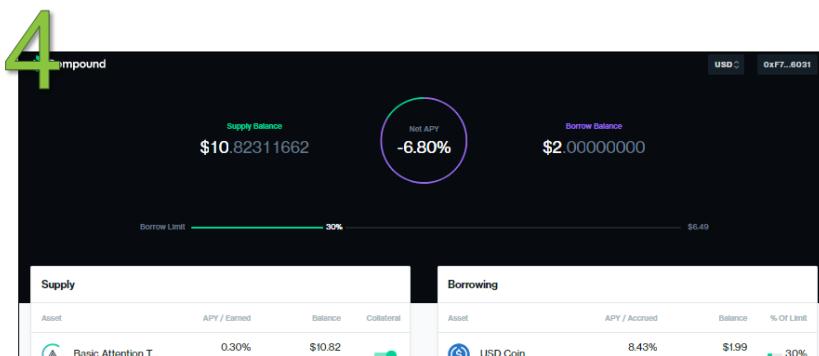
Step 2

- A pop-up on USDC will appear
- Each token has to be enabled individually. You only need to do this once per token



Step 3

- We entered the amount we wish to borrow. In this example, we borrowed 2 USDC
- Confirm the transaction with your wallet



Step 4

- Finished!
- You can see how much you have supplied and how much you have borrowed on Compound's main page.

Recommended Readings

1. The DeFi Series – An overview of the ecosystem and major protocols (Alethio) <https://medium.com/alethio/the-defi-series-an-overview-of-the-ecosystem-and-major-protocols-da27d7b11191>
2. Compound FAQ (Robert Leshner) <https://medium.com/compound-finance/faq-1a2636713b69>
3. DeFi Series #1 - Decentralized Cryptoasset Lending & Borrowing (Binance Research) <https://research.binance.com/analysis/decentralized-finance-lending-borrowing>
4. Zero to DeFi – A beginner’s guide to earning passive income via Compound Finance (Defi Pulse) <https://defipulse.com/blog/zero-to-defi-cdai/>
5. I took out a loan with cryptocurrency and didn’t sign a thing (Stan Schroeder) <https://mashable.com/article/defi-guide-ethereum-decentralized-finance.amp>
6. Earn passive income with Compound. (DefiZap) <https://defitutorials.substack.com/p/earn-passive-income-with-compound>

Aave



Aave is another prominent decentralized money market protocol. As of April 2021, users can lend and borrow 24 different assets on Aave. Notably, Aave offers more assets for users to lend and borrow as compared to Compound.

Both Compound and Aave operate similarly where lenders can provide liquidity by depositing cryptocurrencies into the available lending pools and earn interest. Borrowers can take loans by tapping into these liquidity pools and pay interest.

Aave is more complex than Compound as it offers more flexibility and features. If you want a deeper dive into the key differences between the protocols, you may refer to our How to DeFi: Advanced book.

Here are **eight key features** on Aave:

1. Support more assets

As of April 2021, Aave offers 24 assets for lending and borrowing. Aave has historically been quick in adding more assets to its platform.

2. Stable and variable interest rates on loan

Borrowers have the flexibility to choose between stable or variable interest rates.

3. Rate Switching

Borrowers are also able to switch between stable and variable interest rates.

4. Collateral Swap

Borrowers can swap their collateral for another asset. This helps to prevent loans from going below the minimum collateral ratio and face liquidation.

5. Repayment with collateral

Borrowers can close their loan positions by paying directly with their collateral in one transaction.

6. Flash loans

Borrowers can take up loans with zero collateral if the borrower repays the loan and any additional interest and flash loan fees within the same transaction. Flash loans are useful for arbitrage traders as they are capital-efficient in making arbitrage trades across the various DeFi Dapps.

7. Flash Liquidations

Liquidators can utilize flash loans to borrow capital as part of their liquidation bond and get that liquidation bonus without using their capital.

8. Native Credit Delegation

Borrowers may extend their credit line to other users who wish to borrow without collateral for a higher interest rate.

How much interest will you receive or pay?

Like Compound, the interest rates for both borrowers and lenders are determined algorithmically, subjected to the supply and demand for each asset.

Essentially, the higher the borrowing demand, the higher the interest rate due to less available liquidity in the pool. When this occurs, lenders will earn more.



Current market size **\$ 786,282,821.45** + Expand

Assets	Market size	Total borrowed	Deposit APY	Variable Borrow APR	Stable Borrow APR
USDT Coin (usdt)	\$ 35.6M	\$ 33.28M	12.72 %	24.95 %	29.95 %
Gemini Dollar (gusd)	\$ 2.93M	\$ 2.38M	8.45 %	10.39 %	—
DAI	\$ 48.42M	\$ 39.8M	8.01 %	12.24 %	17.24 %
TrueUSD (tusd)	\$ 5.27M	\$ 4.27M	6.47 %	7.86 %	12.86 %
USD Coin (usdc)	\$ 71.19M	\$ 60.78M	5.82 %	3.79 %	8.90 %
Binance USD (busd)	\$ 7.02M	\$ 5.65M	4.52 %	6.24 %	—
SNX	\$ 6.42M	\$ 2.3M	1.95 %	8.37 %	—
Ethereum (eth)	\$ 179.45M	\$ 49.84M	0.87 %	3.42 %	7.27 %
sUSD	\$ 4.47M	\$ 2.04M	0.83 %	2.28 %	—
Curve DAO Token (crv)	\$ 18.25M	\$ 3.75M	0.66 %	3.19 %	—
REN	\$ 3.38M	\$ 772.46K	0.24 %	3.55 %	5.08 %

As of the time of writing (April 2021), using USDT as an example, lenders who deposit their USDT would earn 5.99% APY. Borrowers meanwhile have the option to choose a loan with variable or stable interest rate. The

variable interest rate for USDT was 3.97% APR while the stable interest rate for USDT was 11.99% APR.

Which interest rate should I choose?

Stable Annual Percentage Rate (APR)

Stable rate is similar to the fixed rate, but it can change over time if market conditions get dire. Borrowers who choose a stable rate prefer to know the exact amount of interest to be repaid and are less likely to be impacted by liquidity fluctuation in the respective liquidity pools.

Variable Annual Percentage Rate (APR)

The variable rate is algorithmically determined based on the supply and demand of an asset in the Aave protocol. The variable interest rates fluctuate to correspond to the amount of liquidity available in reserve.

Do I need to register for an account to start using Aave?

You don't need to! Aave is a decentralized lending protocol where you can connect your wallet and start lending or borrowing available assets.

Start earning interest on Aave

The mechanics are similar to Compound. You will first have to supply assets to the Aave protocol.

Upon depositing your asset, you will receive a proportional amount of aTokens that represents your underlying assets. If you supply USDT, you will receive aUSDT. If you supply YFI, you will receive aYFI and so on.

The interest will immediately accrue on your aTokens on every Ethereum block (~15 seconds). However, you will not receive your interest immediately, and you will need to redeem your aTokens to receive back your capital plus the interest accrued.

Start borrowing on Aave

Before you can start borrowing, you must deposit an asset as collateral to borrow, and the amount deposited must be higher than the amount borrowed. Unlike Compound, Aave determines how much a user can

borrow via a pre-set Loan to Value ratio (LTV), and each asset has a different LTV ranging from [15% to 80%](#).

If the LTV hits the asset's liquidation threshold, liquidators can liquidate up to 50% of your position, with an additional liquidation penalty going up to 15%, depending on the asset.

Do note that not all assets can be used as collateral. Like Compound, tokens that have a single counterparty risk exposure cannot be used as collateral as they can potentially be used to drain the protocol of all liquidity. [Four assets cannot be used as collateral at the time of writing \(April 2021\)](#), namely USDT, GUSD, BUSD, and sUSD.

Aave Governance and how it works?

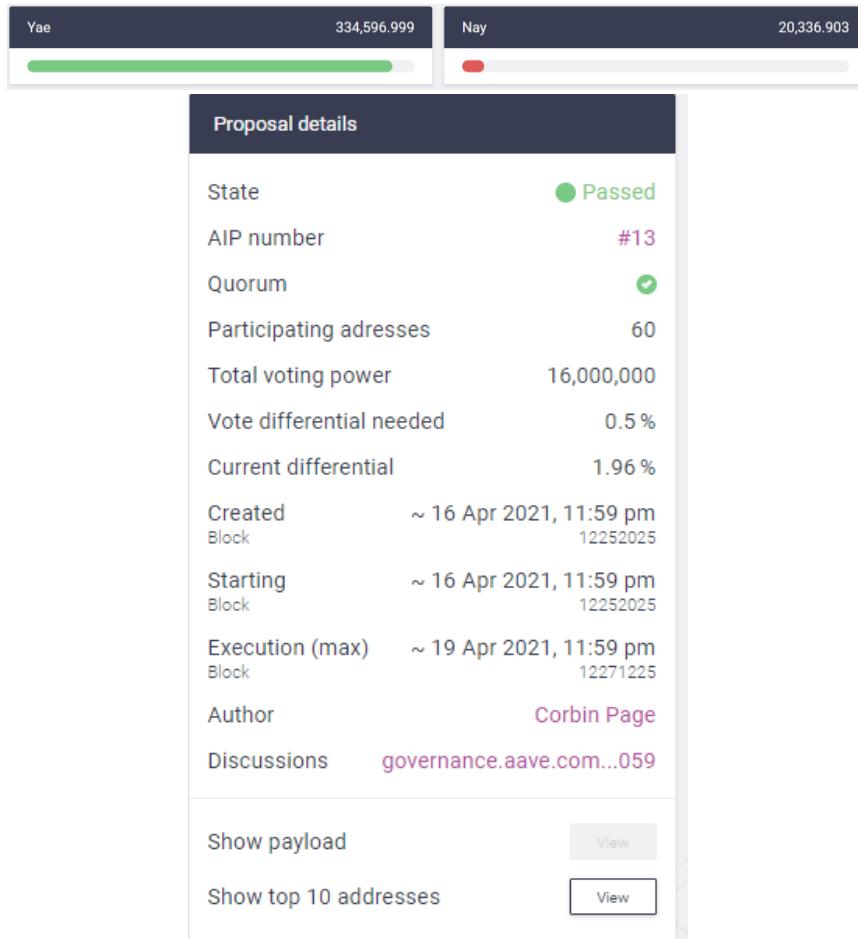
Aave relaunched the second iteration of its protocol (Aave V2) in December 2020. Its native governance token is known as AAVE. Anyone is free to propose an idea for Aave's improvements and adjustments. Here is an overview of how one can table a proposal.

1. Prepare an Aave Request for Comments (ARC) proposal on the [Aave governance forum](#). The community will give feedback on it.
2. If the ARC is non-contentious, the submission of an Aave Improvement Proposal (AIP) can be made.
3. The AIP is submitted to the protocol for voting.

Currently, there are two types of proposal. The initial parameters varies on each type:

- Short time lock executor
 - The initial quorum is 2% ("Yes" votes $\geq 2\%$)
The percentage of "Yes" votes out of total voting power (that is derived from the maximum supply of 16,000,000)
 - The vote differential is 0.5%. ("Yes" votes - "No" votes $\geq 0.5\%$)
The minimum difference between "Yes" and "No" votes out of total voting power.
- Long time lock executor
 - The initial quorum is 20% ("Yes" votes $\geq 20\%$)
 - The vote differential is 15%. ("Yes" votes - "No" votes $\geq 15\%$)

Let's take a look at [a proposal voted on Aave](#):



Here we can see that:

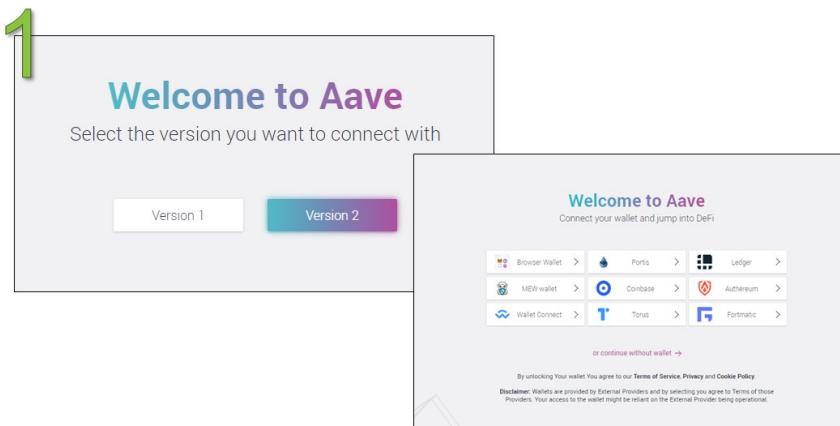
- The proposal is a short time lock executor type.
- Thus the vote differential needed is 0.5% while the quorum needed is 2%
- “Yes” votes amounted to 334,597, or 2.1% of the voting power. This passed the quorum criteria.
- “No” votes amounted to 20,337, or 0.127%
- This implies the current vote differential is 1.96% (2.1% - 0.127%)
- The proposal is passed.

However, it must be noted that the quorum is dynamic and can change based on the quorum + differential of votes for/against an AIP. Using the same proposal above as an example:

- Assuming the “Yes” votes remain the same at 2.1%
- But the “No” votes increased to 1.8%
- Then the current vote differential would become 0.3%, which is lower than the differential needed of 0.5%.
- In order for the vote to pass, the yes vote will have to increase from 2.1% to 2.3% (1.8% + 0.5%).
- Thus, this implies the quorum threshold would increase to 2.3%.

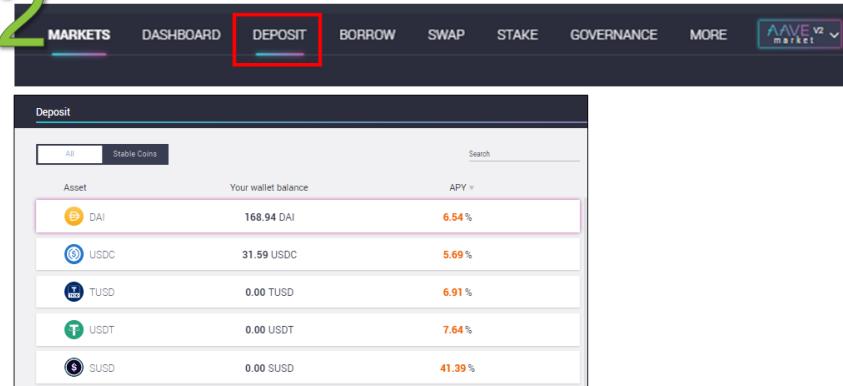
Aave: Step-by-Step Guide

Supplying funds from the pool:



Step 1

- Go to <https://app.aave.com/>
- Connect the wallet of your choice. We used Metamask in this example (Browser Wallet)



Asset	Your wallet balance	APY %
DAI	168.94 DAI	6.54 %
USDC	31.59 USDC	5.69 %
TUSD	0.00 TUSD	6.91 %
USDT	0.00 USDT	7.64 %
GUSD	0.00 GUSD	41.39 %

Step 2

- Select “Deposit” at the top header
- You will see a list of available assets that you can deposit, along with their respective APYs

3

How much would you like to deposit?
Please enter an amount you would like to deposit. The maximum amount you can deposit is shown below.

Available to deposit 168.937073 DAI
100 MAX

Continue Go back

Deposit overview
These are your transaction details. Make sure to check if this is correct before submitting.

Amount 100 DAI \$ 100.42208
1 Approve 2 Deposit 3 Finished
Approve Please approve before depositing Submit

Go back

MetaMask Notification
Allow https://app.aave.com to spend your DAI?
Do you trust this site? By granting this permission, you're allowing https://app.aave.com to withdraw your DAI and automate transactions for you.
Edit Permission

Transaction Fee \$5.00
A fee is associated with this request.
0.003767 ETH
View full transaction details

Reject Confirm

MetaMask Notification
Ethereum Mainnet CG Training 0x7d27...c7...
CONTRACT INTERACTION
0 \$0.00 DETAILS DATA
GAS FEE 0.015884 \$21.13
TOTAL 0.015884 \$21.13
AMOUNT + GAS FEE
Reject Confirm

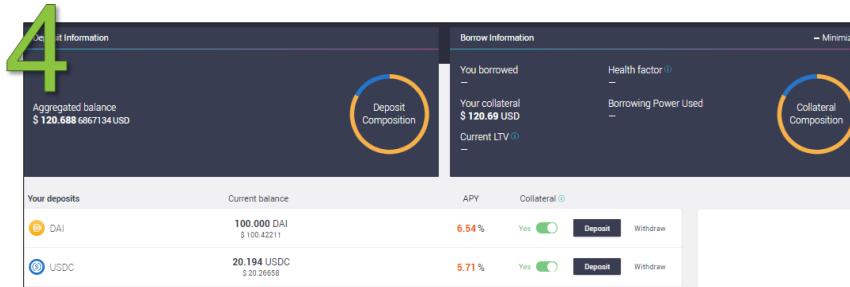
Congrats!
Your action has been successfully executed

Amount 100 DAI \$ 100.42208
1 Approve 2 Deposit 3 Finished
Success! Dashboard
Approve Confirmed Etherscan Deposit Confirmed Etherscan

Step 3

- We chose to supply 100 DAI to the protocol.
- Before you can deposit, you will need to sign approval for the protocol to spend your DAI (this will incur gas fee).
- Upon confirmation, you can then deposit your 100 DAI. You will need to sign another transaction to transfer over your deposit.
- Done! Your asset is now deposited.

Decentralized Lending and Borrowing

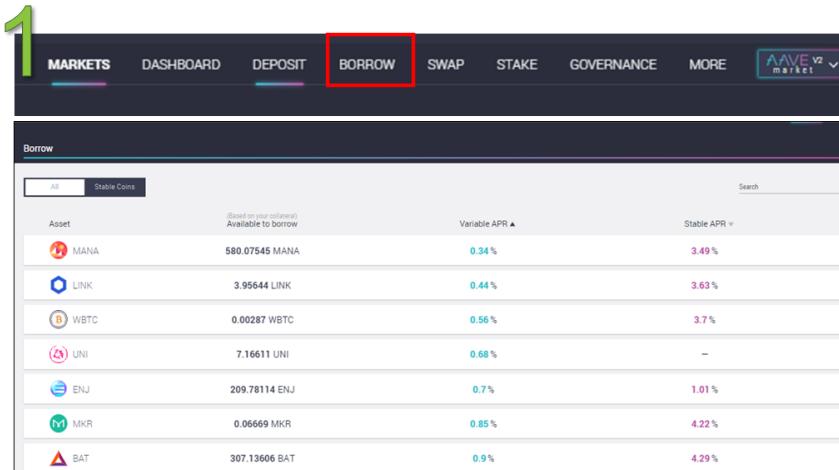


Step 4

- You can see your deposited funds on the “Dashboard” tab.

Borrowing funds from the pool:

Note: Before you can start borrowing, you are **required to supply some assets to Aave as a form of collateral**. Each token has its Loan-to-Value (LTV) ratio which is the ratio of how much you have to supply in order to borrow.



Step 1

- Select “Borrow” on the bar top.
- You’ll see a list of available assets that you can borrow with their respective APRs.

2

How much would you like to borrow?

Please enter an amount you would like to borrow. The maximum amount you can borrow is shown below.

Available to borrow	209.781364 ENJ
 35	MAX

Continue

[Go back](#)

Step 2

- You can choose which asset you wish to borrow. We chose to borrow 35 ENJ.
- Click “Continue”.

3

Please select your interest rate

Choose either stable or variable APR for your loan. Please click on the desired rate type and read the info box for more information on each option.

 Stable APR 0.84 %	 Variable APR 0.59 %
---	---

Borrow overview

These are your transaction details. Make sure to check if this is correct before submitting.

Amount	 35 ENJ \$ 14.91842
Interest (APR)	0.84 %
Interest rate type	Stable
New health factor	6.52

1 Borrow	2 Finished
Borrow	Please submit to borrow
Submit	

[Go back](#)

Borrow overview

These are your transaction details. Make sure to check if this is correct before submitting.

Amount	 35 ENJ \$ 14.89209
Interest (APR)	0.59 %
Interest rate type	Variable
New health factor	6.52

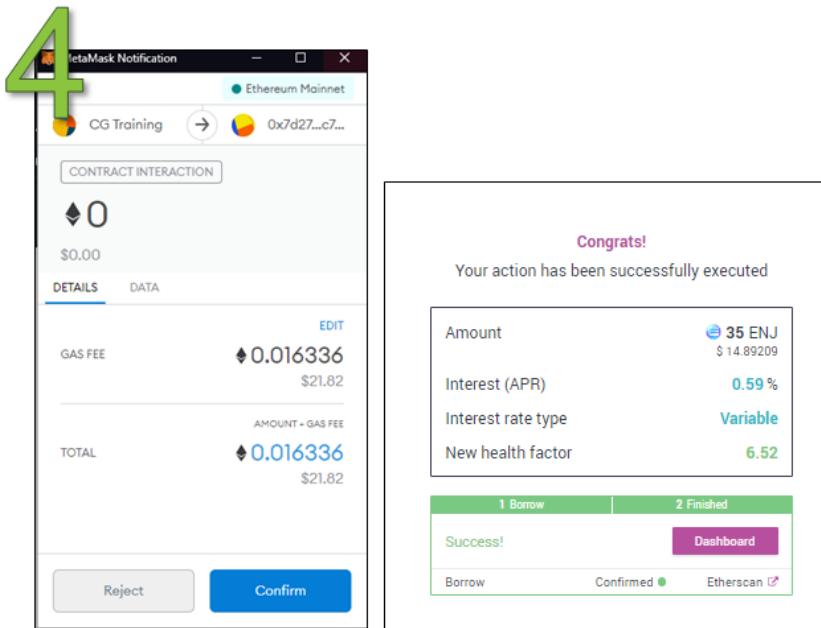
1 Borrow	2 Finished
Borrow	Please submit to borrow
Submit	

[Go back](#)

Step 3

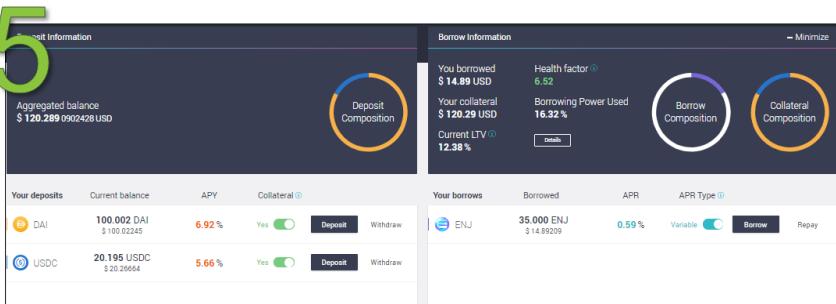
- You will have the option to choose between Stable APR or Variable APR. We chose variable APR because it is lower but that's up for you to decide.

Decentralized Lending and Borrowing



Step 4

- Approve your transaction.
- Success! You have successfully borrowed an asset (in this case, we borrowed 35 ENJ).



Step 5

- You can see your borrowed asset on the “Dashboard” tab

Recommended Readings

1. Aave FAQ <https://docs.aave.com/faq/>
2. The Aave Protocol V2 (Stani Kulechov)
<https://medium.com/aave/the-aave-protocol-v2-f06f299cee04>
3. Aave's aTokens are Latest DeFi Lego Heading to Layer 2 (The Defiant) <https://thedefiant.io/aaves-atokens-are-latest-defi-lego-heading-to-layer-2/>
4. Earning passive income from cryptocurrency in 2020: Market Review (Aave in the list) <https://hackernoon.com/earning-passive-income-from-cryptocurrency-in-2020-market-review-kzt3xom>

CHAPTER 7: DECENTRALIZED EXCHANGES (DEX)

While Centralized Exchanges (CEXs) have plenty of liquidity and allow large trades to happen, it still carries many risks because users do not hold custody of their assets in exchanges. For example, in September 2020, KuCoin suffered a \$281 million hack after a security breach.³

More people are realizing these risks and are turning to Decentralized Exchanges (DEXs). DEXs work by using smart contracts and on-chain transactions to reduce or eliminate the need for an intermediary.

Types of DEX

There are two types of DEXs:

- Order book-based DEXs
- Liquidity pool-based DEXs.

Some popular Decentralized Exchanges include Uniswap, Kyber Network, Curve Finance, dYdX, and SushiSwap. Order book-based DEXs like dYdX and Deversifi operate similarly to CEXs where users can set buy and sell orders at either their chosen limit prices or at market prices. The main difference between the two is that for CEXs, assets for the trade would be

³ (2020, September 25). Over \$280M Drained in KuCoin Crypto Exchange Hack - CoinDesk. Retrieved March 13, 2021, from <https://www.coindesk.com/hackers-drain-kucoin-crypto-exchanges-funds>

held on the exchanges' wallets, whereas for DEXs, assets for the trade would be held on users' wallets.

On the other hand, liquidity pool DEXs such as Uniswap and Balancer lets users become the market makers by providing liquidity to a pair or pool of assets. Users deposit their assets and become liquidity providers, earning a small fee for each swap transaction performed for that particular pool. However, the mechanisms behind these types of DEXs, which mainly use an **Automated Market Maker mechanism**, have their own flaws where users may suffer Impermanent Loss as a liquidity provider.

Limitations of DEX

DEXs have certain limitations as well. Here are some of the limitations:

1. Lower liquidity

The majority of crypto trade still takes place in centralized exchanges. Historically, order books on CEXs have been deeper when compared to DEXs, and traders can thus get better prices when making trades on CEXs.

With lower liquidity, trades on DEX may suffer higher slippage and worse price execution when compared to CEX. However, with the growing popularity of DEXs, liquidity on many popular trading pairs has increased significantly on DEXs, and trade executions on DEXs are at times as competitive as CEXs.

2. Limited features

Centralized exchanges include many advanced trading features such as limit orders, stop-loss orders, trailing stops, and so on. Most of these trading features are not available on DEXs.

Some DEXs now offer limit orders, allowing for a better trading experience. However, a growing number of DEXs are looking to introduce these advanced trading features to compete more effectively against CEXs.

3. Blockchain Interoperability

Most DEXs today only allow traders to swap tokens within the same blockchain ecosystem. Ethereum-based DEXs, for example, only allow users to trade Ethereum and ERC-20 tokens. It does not permit traders to trade tokens issued on other blockchains like Polkadot or Cosmos. CEXs allow users to trade tokens on various blockchains easily. There are efforts to build cross-chain DEXs, and in the future, trading tokens across multiple blockchains on a DEX will be possible.

4. Costs

DeFi has now become popular, and this has resulted in a congested Ethereum network. The congestion on Ethereum has allowed gas costs to increase significantly. Making a trade on a DEX can be a costly transaction, especially during peak periods.

Limitations aside, there's a growing demand for DEXs, and DEXs are still in their infancy stage. We will be dissecting DEXs into digestible bits, such as the mechanisms behind how it works, the type of transactions you can perform, and step-by-step guides on how to get started.

Uniswap



Uniswap is a decentralized token exchange protocol built on Ethereum that allows direct swapping of tokens without the need to use a centralized exchange. When using a centralized exchange, you will need to deposit tokens to an exchange, place an order on the order book, and then withdraw the swapped tokens.

On Uniswap, you can simply swap your tokens directly from your wallet without having to go through the three steps above. All you need to do is send your tokens from your wallet to Uniswap's smart contract address, and

you will receive your desired token in return in your wallet. There is no order book and the token exchange rate is determined algorithmically. All this is achieved via liquidity pools and the automated market maker mechanism.

Liquidity Pools

Liquidity pools are token reserves that sit on Uniswap's smart contracts and are available for users to exchange tokens with. For example, using the ETH-DAI trading pair with 100 ETH and 20,000 DAI in the liquidity reserves, a user that wants to buy ETH using DAI may send 202.02 DAI to the Uniswap smart contract to get 1 ETH in return. Once the swap has taken place, the liquidity pool is left with 99 ETH and 20,202.02 DAI.

Liquidity pools' reserves are provided by liquidity providers who are incentivized to obtain a proportionate fee of Uniswap's 0.3% transaction fee. This fee is charged for every token swap on Uniswap.

Anyone can be a liquidity provider - the only requirement is that one needs to provide ETH and the quoted trading token. As of January 2021, over [2.3 million ETH have been locked](#) into Uniswap. The amount of reserves held by a pool plays a huge role in determining how prices are set by the Automated Market Maker Mechanism.

Automated Market Maker Mechanism

Prices of assets in the pool are algorithmically determined using the Automated Market Maker (AMM) algorithm. AMM works by maintaining a Constant Product based on the amount of liquidity on both sides of the pool.

Let's continue the ETH-DAI liquidity pool example, using 100 ETH and 20,000 DAI. To calculate the Constant Product, Uniswap will multiply both these amounts together.

$$\text{ETH liquidity (x)} * \text{DAI liquidity (y)} = \text{Constant Product (k)}$$

$$100 * 20,000 = 2,000,000$$

Using AMM, at any given time, the Constant Product (k) must always remain at 2,000,000. If someone buys ETH using DAI, ETH will be removed from the liquidity pool while DAI will be added into the liquidity pool.

The price for this ETH will be determined asymptotically. Therefore, the larger the order, the larger the premium that is charged. Premium refers to the additional amount of DAI required to purchase 1 ETH compared to the original price of 200 DAI per ETH.

The table on the next page further elaborates the asymptotic pricing and the movement of liquidity when orders to purchase ETH are made.

As can be seen from the table, the larger the amount of ETH that a user wishes to buy, the larger the premium that will be charged. This ensures that the liquidity pool will never run dry.

How to get a token added on Uniswap?

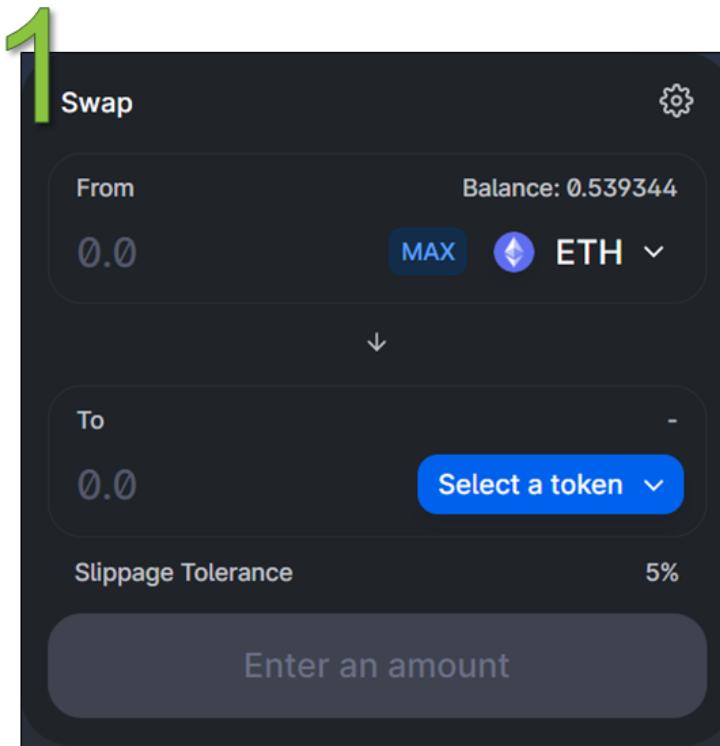
Unlike centralized exchanges, Uniswap as a decentralized exchange does not have a team or gatekeepers to evaluate and decide on which tokens to list. Instead, any ERC-20 token can be listed on Uniswap by anyone and be traded as long as liquidity exists for the given pair. All a user needs to do is interact with the platform to register the new token and a new market will be initialized for this token.

And that's it for Uniswap - if you're keen to get started or test it out, we've included step-by-step guides on how to (i) swap tokens, (ii) provide liquidity, and (iii) stop providing liquidity. Otherwise, head on to the next section to read more on the next DeFi dapp!

ETH Purchased	Cost per ETH in DAI	Total Cost in DAI	Premium	New DAI Liquidity	New ETH liquidity	Product (k)
1	202.02	202.02	1.01%	20,202.02	99	2,000,000
5	210.52	1,052.63	5.26%	21,052.63	95	2,000,000
10	222.22	2,222.22	11.11%	22,222.22	90	2,000,000
50	400	20,000	200%	40,000	50	2,000,000
75	800	60,000	400%	80,000	25	2,000,000
99	20,000	1,980,000	10,000%	2,000,000	1	2,000,000
100	Infinity	Infinity	Infinity	Infinity	0	2,000,000

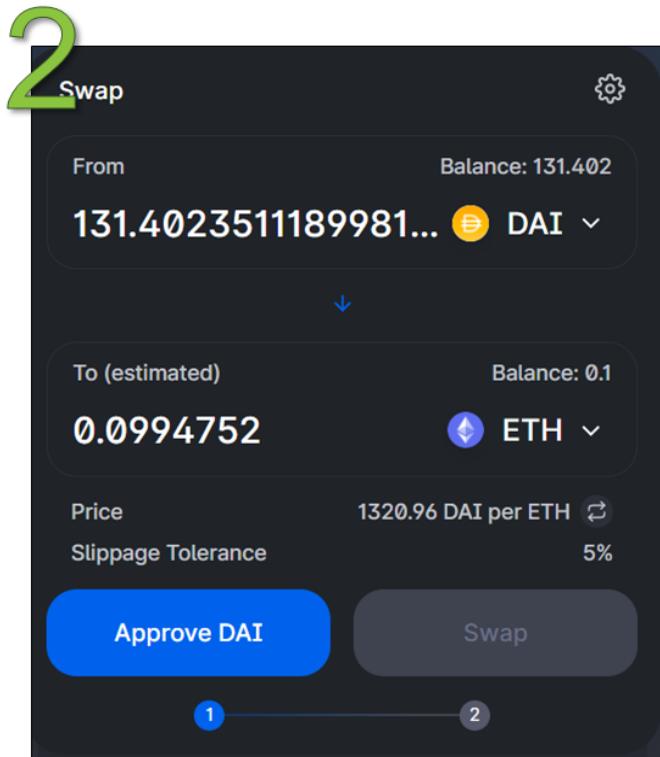
Uniswap: Step-by-Step Guide

Swapping Tokens



Step 1

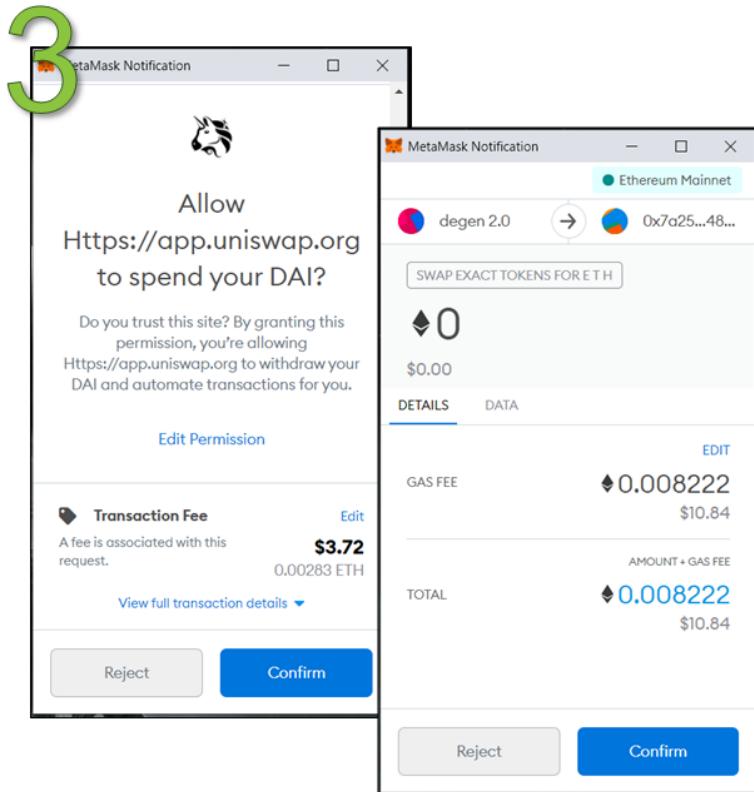
- Head on over to <https://app.uniswap.org/> and click swap token
- To start using Uniswap, you will need to connect to a wallet. You may connect your Metamask wallet. Connecting your wallet is free, all you need to do is sign a transaction



Step 2

- After connecting your wallet, choose which tokens you would like to trade. In this example, we are using DAI to buy ETH

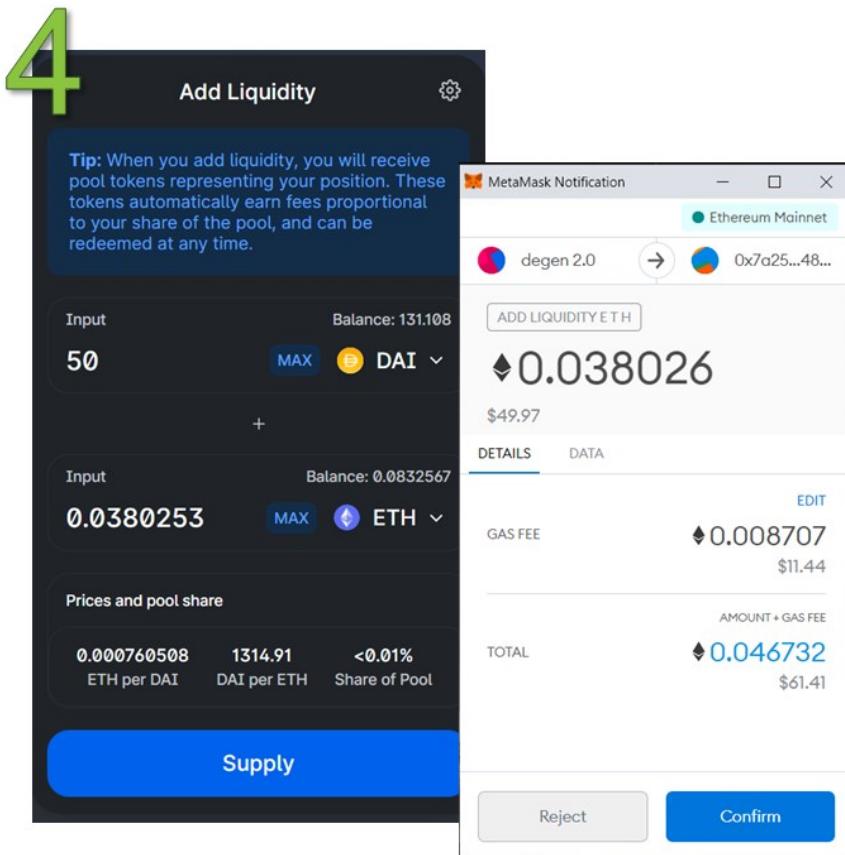
Decentralized Exchanges (DEX)



Step 3

- If it's your first time transacting this token, you'll need to unlock it by paying a small fee
- You'll be prompted with another transaction
- Once your transaction is confirmed, you'll have your ETH!

Provide Liquidity

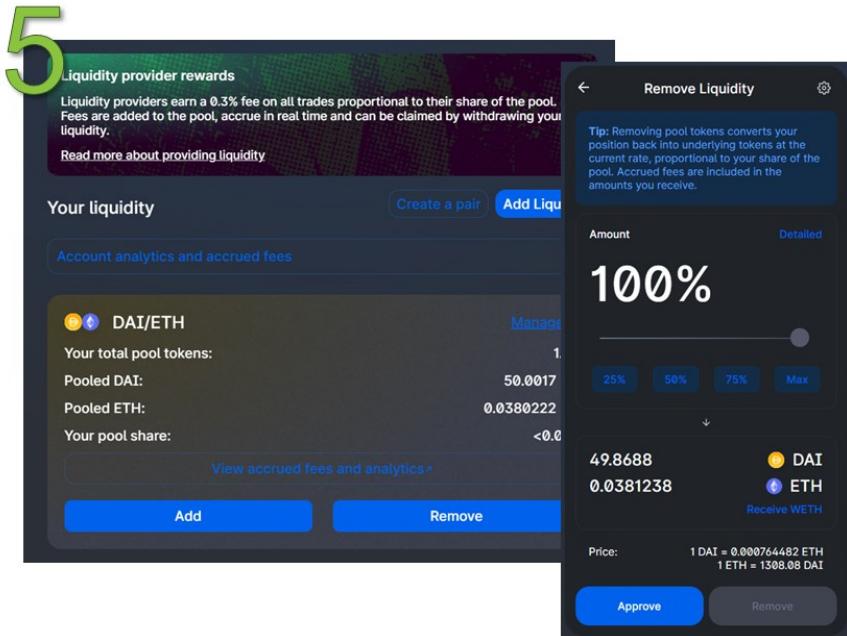


Step 4

- Go to Pool and click 'Add Liquidity' before filling in the amount of liquidity you wish to provide. In this case, we're providing 50 DAI worth of liquidity + 0.0380 ETH
- Note: you must have an equivalent amount of ETH to provide liquidity for that token
- After clicking add liquidity, you'll be shown the amount of pool tokens you will receive and a prompt to sign another transaction
- Once that's done, you're now confirmed as a liquidity provider and stand to earn a proportionate amount of the exchange fees

Decentralized Exchanges (DEX)

Withdraw Liquidity



Step 5

- What if you don't want to provide liquidity anymore?
- Go back to the pool to view the pairs you are providing liquidity for and select remove liquidity
- As you can see, we'll be getting back 0.13 DAI less but receiving slightly more ETH
- Note that the ratio of our ETH and DAI is now different, so that's one of the caveats with liquidity pools. If we had removed it later, we might have a very different proportion of DAI to ETH
- The pool tokens represent your share of the liquidity pool. When you remove your liquidity, you will be burning the pool tokens to get back your DAI and ETH.

Recommended Readings

1. Getting Started (Uniswap) <https://docs.uniswap.io/>
2. The Ultimate Guide to Uniswap. (DefiZap)
<https://defitutorials.substack.com/p/the-ultimate-guide-to-uniswap>
3. A Graphical Guide for Understanding Uniswap (EthHub)
<https://docs.ethhub.io/guides/graphical-guide-for-understanding-uniswap>
4. Uniswap — A Unique Exchange (Cyrus Younessi)
<https://medium.com/scalar-capital/uniswap-a-unique-exchange-f4ef44f807bf>
5. What is Uniswap? A Detailed Beginner's Guide (Bisade Asolo)
<https://www.mycryptopedia.com/what-is-uniswap-a-detailed-beginners-guide/>
6. Are Uniswap's Liquidity Pools Right for You? (Chris Blec)
<https://defiprime.com/uniswap-liquidity-pools>
7. Understanding Uniswap Returns (Pintail)
<https://medium.com/@pintail/understanding-uniswap-returns-cc593f3499ef>
8. UniSwap Traction Analysis (Ganesh)
<https://www.covalenthq.com/blog/understanding-uniswap-data-analysis/>
9. A Deep Dive into Liquidity Pools (Rebecca Mqamelo)
<https://blog.zerion.io/liquidity-pools-8ac8cf8cf230>

DEX Aggregators

There are multiple DEXs in the market today, each with its separate liquidity pools. Traders who want to make sufficiently large token swaps may incur high slippage and high price premium. The amount of slippage incurred by traders depends on the amount of liquidity available in each DEX. To minimize the slippage, traders may split the trades into smaller parts and route them onto the separate DEXs.

Splitting and routing large trades across several DEXs in a manual way is a very cumbersome process. Fortunately, traders can make use of DEX aggregators to simplify things and save gas. As its name suggests, DEX aggregators pool liquidity from the various DEXs in the market to help traders execute large trades at the best price. With DEX aggregators, traders can automatically split their large trades into smaller parts and route them to the relevant DEXs for the best execution price.

Examples of DEX aggregators include 1inch, Paraswap, and Matcha. We will be taking a closer look at 1inch, one of the most widely used DEX aggregators.

1inch



1inch is a DEX aggregator that helps users discover the best trade prices for tokens. At the time of writing (April 2021), there are over 40 sources of liquidity on 1inch. Instead of swapping tokens from a single DEX's liquidity pool, 1inch will aggregate liquidity across the various liquidity pools and suggest the most efficient token trade route.

By routing a single transaction through multiple liquidity pools instead of only one liquidity pool, traders making large trades can ensure they get the best price by minimizing price slippage. Traders also take advantage of gas savings by bundling multiple transactions across the various DEXs into a single transaction on 1inch.

To achieve the most optimum trading route for the best price execution and the lowest cost, 1inch makes use of their proprietary routing algorithm, **Pathfinder**. Pathfinder searches across various DEXs such as Uniswap, Balancer, and also 1inch's own liquidity protocol (formerly known as Mooniswap), before providing a recommended route for the best trade prices.

The fees charged to use 1inch depends on the fees charged by the underlying DEX. For example, Uniswap charges a 0.3% trading fee, with the fee flowing to Uniswap liquidity providers.

1inch recently launched its governance token, 1INCH, on 25 December 2020. Users holding the 1INCH governance token can participate in 1inch governance and vote on decisions affecting the future of 1inch. For example, token holders can vote on the swap fee charged on 1inch's liquidity pool, governance reward, referral reward, and more.

That's pretty much it for 1inch! If you are looking to try out 1inch, we have included a step-by-step guide on how to perform a transaction on 1inch. Otherwise, head on over to the next section to learn more about the next DeFi Dapp.

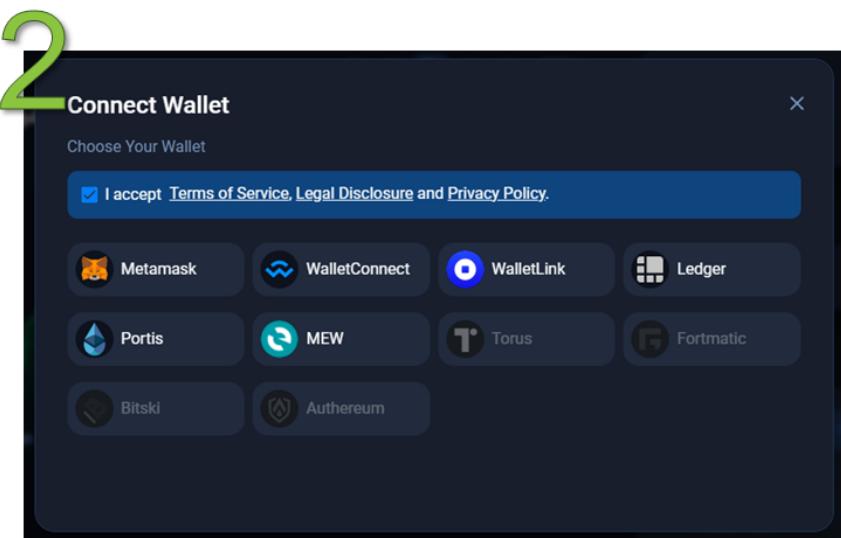
Decentralized Exchanges (DEX)

1inch: Step-by-Step Guide



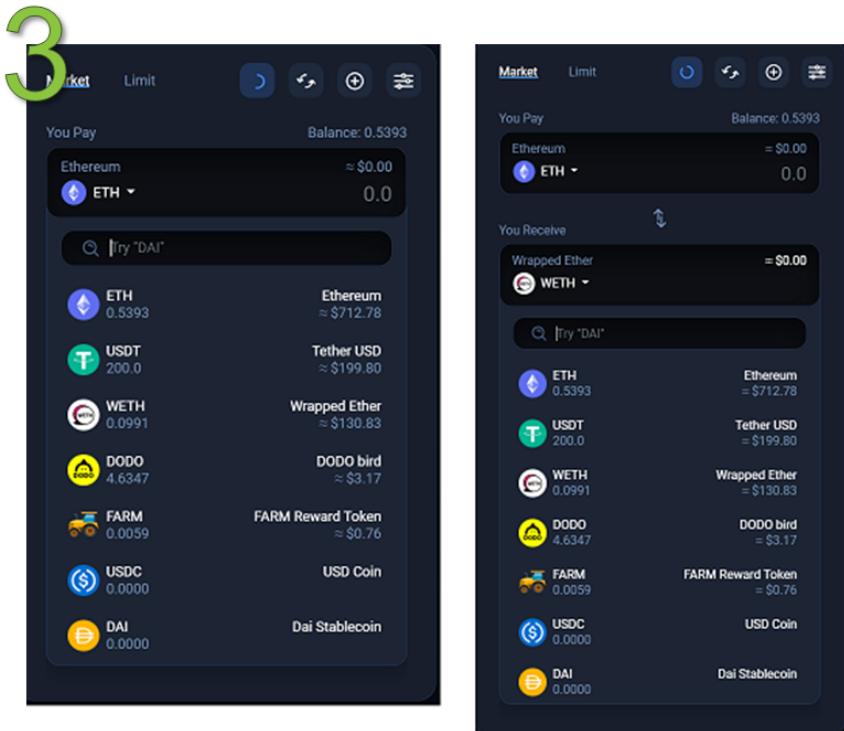
Step 1

- Go to <https://1inch.exchange/>
- Click “Connect Wallet” on the top right corner



Step 2

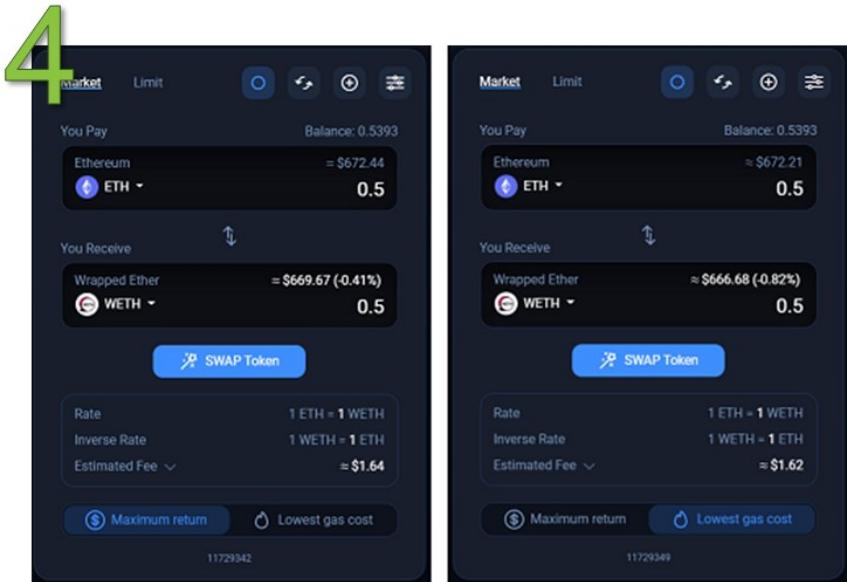
- Click on the tick box to accept the Terms & Conditions
- Choose which wallet to connect



Step 3

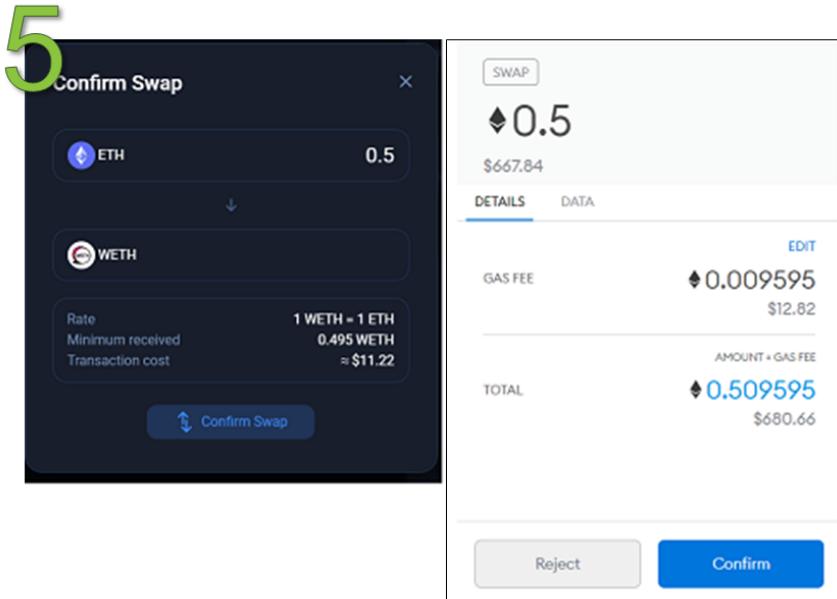
- Select which asset pair to trade
- For this example, we will choose to swap Ether for Wrapped Ether

Decentralized Exchanges (DEX)



Step 4

- Enter the amount of tokens you would like to swap
- 1inch will show you the amount of tokens you would receive in exchange
- Note that you may choose to swap tokens based on maximum return or lowest gas costs. To choose an option, simply click on the corresponding box.
- If you are satisfied with the prices, click 'SWAP Token' to submit your transaction.
- For limit orders, you have to additionally enter your desired price and expiry date to perform the transaction.



Step 5

- You will be shown the rates, minimum tokens that may be received and the transaction costs. Click 'Confirm Swap' to proceed with the transaction.
- Confirm the transaction through your wallet
- Once the transaction has been successfully confirmed, you're done!

Recommended Readings

1. 1inch Exchange Review <https://defirate.com/1inch/>
2. 1inch Exchange, Mooniswap and Chi GasToken: The ultimate review and guide (Angela Wang) <https://boxmining.com/1inch-mooniswap-chi-gastoken/>
3. A beginner's guide to trading on 1inch <https://1inch-exchange.medium.com/a-beginners-guide-to-trading-on-1inch-693d9f801a51>

CHAPTER 8: DECENTRALIZED DERIVATIVES

A derivative is a contract whose value is derived from another underlying asset such as stocks, commodities, currencies, indexes, bonds, or interest rates. Each type of derivative, whether futures, options or swaps serves a different purpose, and each investor buys or sells them for various reasons.

Some of the reasons investors trade derivatives are to hedge themselves against the volatility of the underlying asset, speculate on the directional movement of the underlying asset, or leverage their holdings. Derivatives are extremely risky, and one must be equipped with strong financial knowledge and strategies when trading them.

The market capitalization of DeFi derivatives Dapps is \$5.82 Billion, or 8.2% of the DeFi ecosystem. Decentralized derivatives have struggled to take off due to the high gas fees on Ethereum. As such, the market capitalization figure is relatively low compared to other DeFi sectors, such as the lending market (\$10.68 billion).

Although there are many DeFi derivatives protocols, we will be looking at the major ones, which are Synthetix and Opyn.

Synthetix



Synthetix is exactly as the name sounds, a protocol for Synthetic Assets (called Synths) on Ethereum. There are two parts to Synthetix—Synthetic Assets (**Synths**) and its exchange, **Synthetix.Exchange**. Synthetix allows for the issuance and trading of Synths.

What are Synthetic Assets (Synths)?

Synths are assets or a mixture of assets that have the same value or effect as another asset. Synths track the value of underlying assets and allow exposure to the assets without the need to hold the actual asset.

There are currently two different types of Synths - Normal Synths and Inverse Synths. Normal Synths are positively correlated with the underlying assets, while Inverse Synths are negatively correlated with the underlying assets.

An example of a Synthetic Asset is Synthetic Gold (sXAU) which tracks the price performance of gold. Synthetix tracks real-world asset prices by utilizing the services of Chainlink, a smart contract oracle that obtains price feed from several trusted third-party sources to prevent tampering.

An example of an Inverse Synthetic Asset is Inverse Bitcoin (iBTC) which tracks the inverse price performance of Bitcoin. There are three key values related to each Inverse Synths - the entry price, lower limit, and upper limit.

Let's consider Inverse Synthetic Bitcoin (iBTC) as an example. Assume that at the time of creation, Bitcoin (BTC) is priced at \$10,600 - this will be the entry price. If Bitcoin moves down \$400 to \$10,200, the iBTC Synth will be worth an additional \$400 and priced at \$11,000. The opposite will also be

true. Conversely, if Bitcoin moves up to \$11,000, the iBTC Synth will now be worth \$10,200.

Inverse Synths trade in a range with a 50% upper and lower limit from the entry price. This places a cap on the maximum profit or loss you can obtain on Inverse Synths. Once either of the limits is reached, the tokens' exchange rates are frozen and the positions liquidated. Once disabled and liquidated, these Inverse Synths can only be exchanged at Synthetix.Exchange at those fixed values. They are then reset with different limits.

Why Synthetic Assets?

As mentioned above, Synths give traders price exposure to the asset without the need to hold the underlying asset. Compared to traditional gold brokerages, Synthetic Gold (sXAU) allows traders to participate in the market with much less hassle (no sign-ups, no traveling, no middleman, etc.).

Synths have another utility—they can be traded frictionlessly between one another, meaning Synthetic Gold can be switched for Synthetic JPY, Synthetic Silver, or Synthetic Bitcoin easily on [Synthetix.Exchange](#). This also means that anyone with an Ethereum wallet now has open access to any real-world asset!

How are Synths Created?

The idea behind the creation of Synths is similar to the creation of DAI on Maker. You first have to stake ETH as collateral on Maker's smart contract before being allowed to create DAI based on the collateral posted.

For Synths, you first need to stake the Synthetix Network Token (SNX), which acts as the collateral backing the entire system. SNX is less liquid compared to ETH, and its price is generally more volatile. To counter that, a large minimum initial collateral of 500% is needed on Synthetic compared to the minimum 150% initial collateral needed on Maker.

This means that to mint \$100 worth of Synthetic USD (sUSD), you will need a minimum of \$500 worth of SNX as collateral.

Note: As of January 2021, the only Synth that users can mint is sUSD.

Minting of Synths is a fairly intricate system. It entails the staker taking on debt, the levels of which dynamically fluctuate according to the total value of Synths in the global debt pool. For example, if 100% of the Synths in the system were synthetic Ethereum (sETH), and the price of ETH doubles, everyone's debt would double, including the staker's debt as well.

Once minted, these Synths tokens can be traded on Synthetix.Exchange or on Decentralized Exchanges like Uniswap.

If you want to trade Synths but don't want to take on Debt or mint your own Synths, you can also buy them from a decentralized exchange.

What Assets do Synths Support?

At the point of writing (April 2021), Synths support the following five major asset classes ([full list](#)):

- (i) **Cryptocurrencies:** Ethereum (ETH), Bitcoin (BTC), Dash (DASH), Cardano (ADA), EOS (EOS), Ethereum Classic (ETC), Monero (XMR), Binance Coin (BNB), Tezos (XTZ), Tron (TRX), Litecoin (LTC), Chainlink (LINK), Ripple (XRP), Ren (REN), Aave (AAVE), Compound (COMP), Uniswap (UNI), Yearn Finance (YFI) and Polkadot (DOT)
- (ii) **Commodities:** Gold (XAU), Silver (XAG) and Oil (OIL)
- (iii) **Fiat Currencies:** USD, AUD, CHF, JPY, EUR, and GBP
- (iv) **Indexes:** Centralised Exchange Index (CEX), FTSE 100 Index (FTSE), Nikkei 225 Index (NIKKEI) and DeFi Index (DEFI)
- (v) **Stocks:** Tesla (TSLA)

Index Synths

One of the interesting Synths available on Synthetix is the Index Synths. At the time of writing (April 2021), there are four different Index Synths, namely sCEX, sDEFI, sFTSE, and sNIKKEI.

Index Synths provide traders with exposure to a basket of tokens without the need to purchase all the underlying tokens. The index will mirror the overall performance of the underlying tokens. Index Synths allow for exposure to particular segments of the industry and diversification of risks without holding and managing various tokens.

sCEX

sCEX is an Index Synth designed to give traders exposure to a basket of Centralized Exchange (CEX) tokens roughly approximating their weighted market capitalization. The current sCEX index consists of Binance Coin (BNB), Crypto.com (CRO), Bitfinex's LEO Token (LEO), Huobi Token (HT), OKEx Token (OKB), FTX Token (FTT), and KuCoin Shares (KCS).

There is also the Inverse Synth called iCEX, which is an inverse of the sCEX Index Synth and works like other Inverse Synths.

sDEFI

With the growing interest in DeFi, the sDEFI Index Synth was introduced to provide traders with an index exposure to a basket of DeFi utility tokens in the ecosystem. The current sDEFI index consists of the following tokens: Aave (AAVE), Synthetix Network Token (SNX), Uniswap (UNI), Maker (MKR), Balancer (BAL), Compound (COMP), Curve (CRV), Kyber Network (KNC), Ren (REN), Sushiswap (SUSHI), UMA (UMA), Yearn Finance (YFI), 1inch (1INCH) and Bancor (BNT).

The inverse of this Index Synth is called iDEFI.

sFTSE and sNIKKEI, in the meantime, track the price of the FTSE 100 Index (FTSE100) and Nikkei 225 Index (NIKKEI225) through price feed supplied by Chainlink oracle.

Synthetix Exchange

Synthetix Exchange is a decentralized exchange platform designed for the trading of SNX and Synths. Synthetix Exchange does not have order books, nor does it have liquidity pools like Uniswap. Synthetix Exchange allows users to trade directly against a smart contract that maintains constantly adequate liquidity, thus theoretically reducing risks of slippage or lack of liquidity.

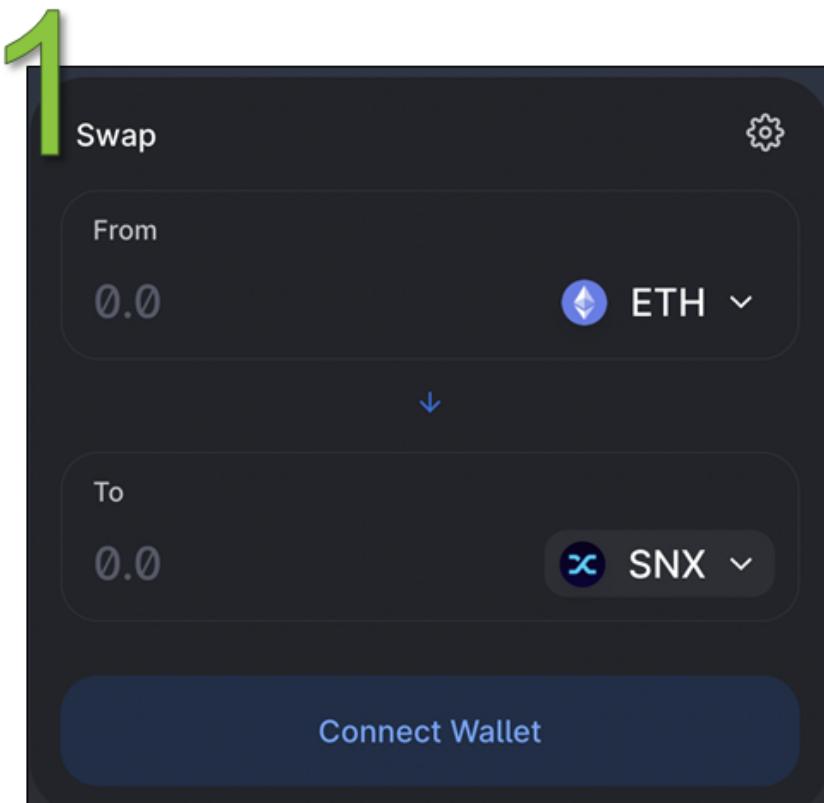
Since users are purchasing a synthetic contract rather than trading the underlying asset, users can buy up to the total amount of collateral in the system without affecting the contract's price. For example, a \$10,000,000 BTC buy/sell order would likely result in considerable slippage in traditional

exchanges, but not in Synthetix Exchange as users trade against the Synthetix contract directly.

For the stats of the Synthetix protocol, please refer to <https://dashboard.synthetix.io/#synths>

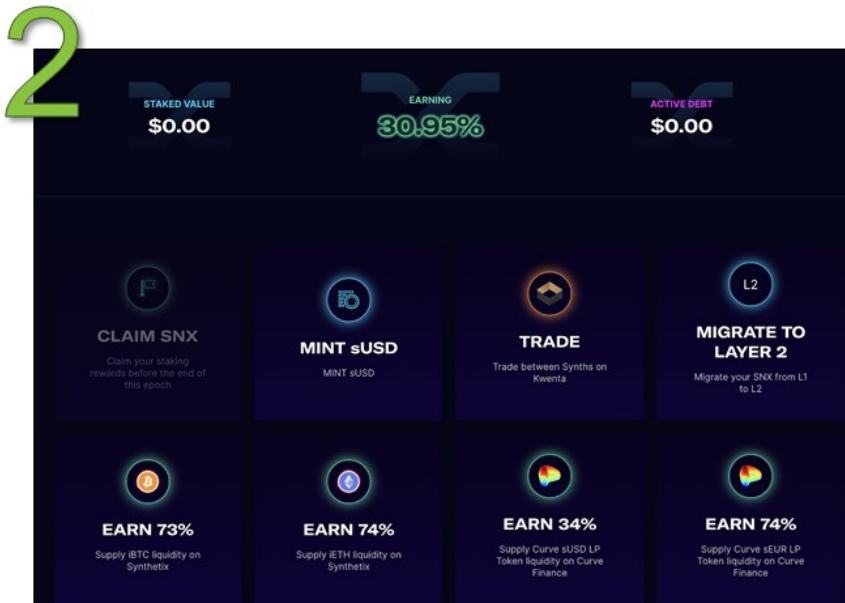
And that's it for Synthetix - if you are keen to get started or test it out, we have included a step-by-step guide on how to mint a Synth. Otherwise, head on to the next section to read more on the next DeFi Dapp!

Synthetix: Step-by-Step Guide



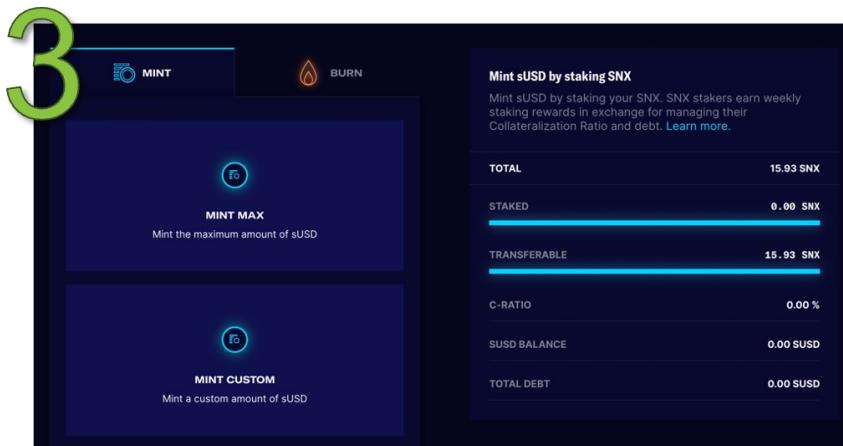
Step 1

- Before you could mint any synth, you will need SNX token to be used as collateral
- If you do not have one, you could check out our [SNX page](#) to see the list of available exchanges to trade for it
- In this tutorial, we swap our ETH for SNX on Uniswap (<https://uniswap.exchange/swap>)
- Connect your wallet and enter the amount of ETH you wish to swap for SNX



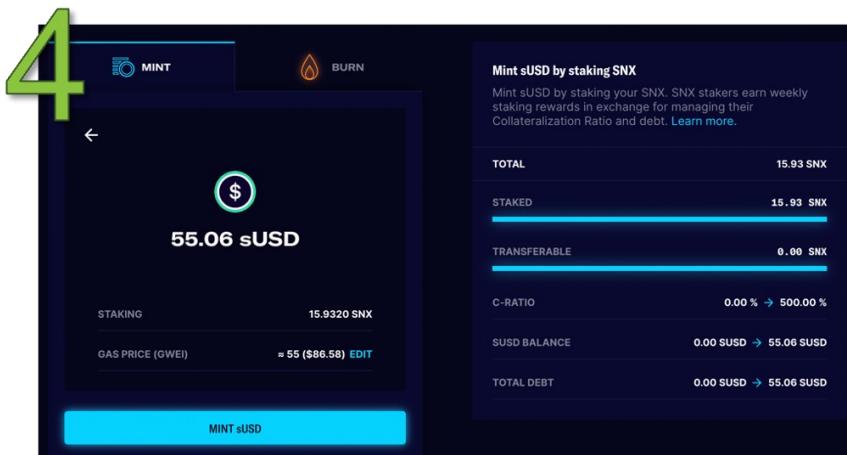
Step 2

- To mint your Synth, go to <https://staking.synthetix.io/>
- Connect your wallet
- Click “MINT sUSD”



Step 3

- Choose “MINT MAX” or “MINT CUSTOM”
- We choose “MINT MAX” for this example



Step 4

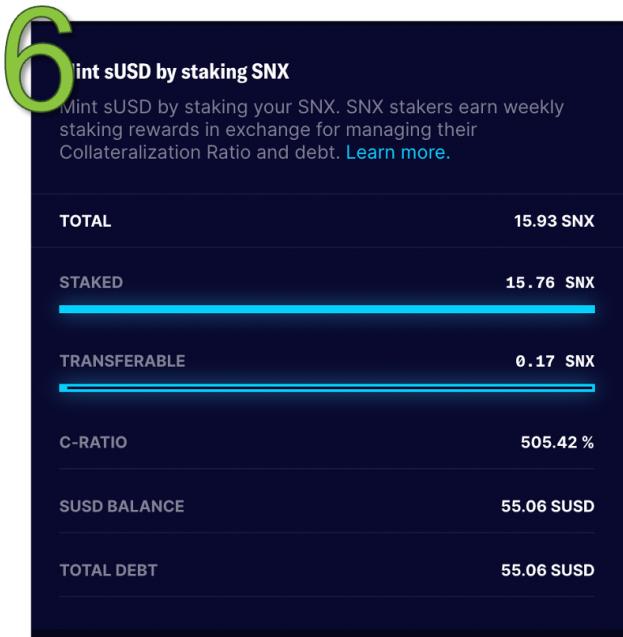
- The available amount to mint depends on the collateral ratio of SNX to the Synth
- As of April 2021, the current collateral ratio is 500%, as shown by the C-RATIO on the right
- So $\$275.55 / 500\%$ is roughly equal to 55.06 sUSD
- Click “MINT sUSD”

Decentralized Derivatives



Step 5

- A Metamask pop-up will show up, then click 'Confirm'.
- The website will show minting in progress while we are waiting for the transaction to go through.



Step 6

- After confirmation, you will be able to see sUSD in your wallet balance.

Recommended Readings

1. Crypto Derivatives, Lending, and a touch of Stablecoin (Gary Basin) <https://blockgeeks.com/guides/defi-use-cases-the-best-examples-of-decentralised-finance/# Tool 2 DeFi Derivatives>
2. DeFi Use cases: The Best Examples of Decentralised Finance (Rajarshi Mitra) <https://hackernoon.com/crypto-derivatives-lending-and-a-touch-of-stablecoin-59e727510024>
3. The Ultimate Guide To Synthetix. (DefiZap and @DegenSpartan) <https://defitutorials.substack.com/p/the-ultimate-guide-to-synthetix>
4. Synthetix (Cooper Turley and Lucas Campbell) <https://fitznerblockchain.consulting/synthetix/>
5. Synthetix for dummies (TwiceCrypto) <https://medium.com/@TwiceCrypto/synthetix-for-dummies-477a0760d335>
6. Synthetic Instruments In DeFi : Synthetix (Joel John) <https://www.decentralised.co/understanding-synthetix/amp/?>
7. Synthetic Assets in DeFi: Use Cases & Opportunities (Dmitriy Berenzon) <https://medium.com/zenith-ventures/synthetic-assets-in-defi-use-cases-opportunities-19b11f57a776>
8. The Value and Risk of Synthetix (Gavin Low) <https://medium.com/the-spartan-group/the-value-and-risk-of-synthetix-45204346ce>

Opyn



What is Opyn?

Opyn provides protection against price volatility on your assets as well as insurance for smart contracts. Users can get protection for Ethereum (ETH), Wrapped Bitcoin (WBTC), Yearn Finance (YFI), Uniswap (UNI), DeFiPulseIndex (DPI), and USDC and DAI deposits on Compound (COMP).

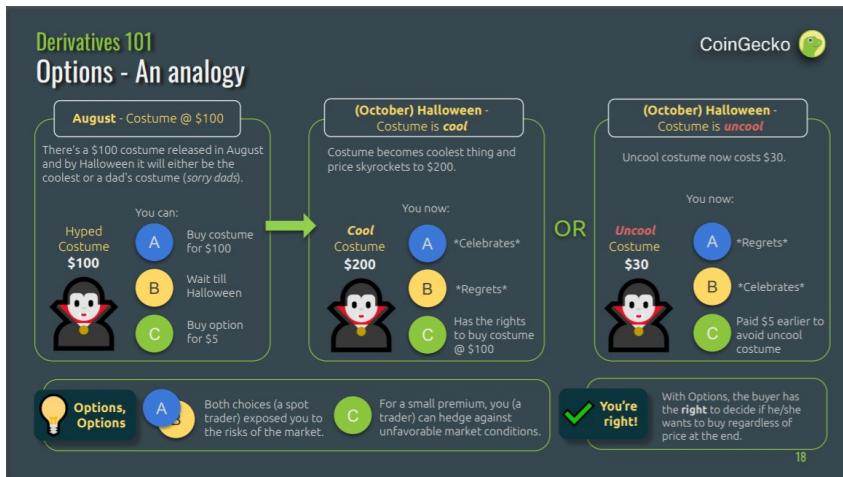
In addition to smart contract failures, Opyn also protects against other risks such as financial and admin risks. Opyn does this by making use of financial derivatives, namely options.

What are Options?

There are two kinds of options: Call and Put. A Call option is a right, but not the obligation to purchase an asset at a specific strike price within a particular period of time. On the other hand, a Put option is a right, but not the obligation to sell an asset at a specific strike price within a particular period of time.

For every purchaser of an option, there must be a seller of an option. A purchaser of an option will pay a premium to the seller of the option to get this right.

Here is a Halloween analogy of a Call option to better help your understanding of options:



There are two main options flavors, namely American and European options. The difference between the two is that for an American option, the buyer can exercise the option anytime before the expiry date, whereas for a European option, the buyer can only exercise it only on the strike date.

How does Opyn work?

Opyn allows users to hedge against the risk of price fluctuations, smart contract exploits, administration/governance risks, and black swan events. For instance, Opyn allows users to buy put options on ETH and WBTC.

By using Opyn, a trader can buy oTokens which can be used as a right to sell ETH and get back USDC in the event of a massive price plunge, thereby receiving protection against downside risk.

For example, let's say that a user purchases one put option on ETH with a strike price of \$2,400. If the price of ETH were to plunge below the strike price, let's say to \$2,000. **With Opyn's oToken put options, the option holder can redeem a cash settlement on the price difference, or \$400.** Although a premium is charged on purchasing options, which may vary based on market participants, in extreme events, the benefits would far outweigh the cost by limiting the amount of loss incurred by the holder. No centralized entity is needed to be the counterparty for exercising the options, making this a truly decentralized insurance platform.

How much do options cost?

The price of options and insurance on Opyn varies by protocol, option type, cover period, and cover amount. In Opyn version 1, the oTokens minted on Opyn can be traded on decentralized exchanges like Uniswap, but in Opyn version 2, options are traded using an order book model, where buyers and sellers can place their limit orders. Regardless, the value of the oTokens would fluctuate based on the supply and demand of options for a given protocol.

The price quoted usually reflects the intrinsic value of the option. For instance, if the strike price of a put option is \$2,000, whereas the asset's current price is \$1,000, you would expect the price of the put option to be at least the difference between the asset price and the strike price. In this case, the option would be worth at least \$1,000. However, other factors such as time decay or fundamentally negative changes in an asset's value would also be incurred as a discount to the option premium.

One thing to note is that because the pricing of oTokens is determined by supply and demand, one can use this as a signaling mechanism to check if the options are over or undervalued. If people believe that the option is undervalued, they will start purchasing more oTokens, and the oTokens would increase in price.

Why would anyone sell protection on Opyn?

For every purchaser of insurance (purchaser of Put option) on Opyn, there must be a provider of insurance (seller of Put option) on Opyn. By being an insurance provider on Opyn, individuals can earn a yield on their holdings of ETH, YFI, UNI, WBTC, or DPI.

To do so, one needs to start by supplying any of these assets as collateral to Opyn's smart contract. Depending on the insurance sold, different collateralization ratios are required. Compound deposits require a 140% ratio, whereas all other put and call options need 100%.

Once collateral has been provided, oTokens can be minted. From there, premiums can be earned in two ways:

1. Being a Liquidity Provider on Uniswap

As a Liquidity Provider on Uniswap, one can earn transaction fees from individuals buying and selling on the Opyn platform through Uniswap. Liquidity Providers have the opportunity to make a large but variable return from providing liquidity on Uniswap. Liquidity Providers are allowed to remove funds at any time. Our section on Uniswap shows you the steps to provide liquidity on Uniswap.

2. Selling oTokens on Uniswap

The oTokens that have been minted can be sold on Uniswap. To calculate the return for selling oTokens on Uniswap, you can look at Opyn's 'sell protection' tab. Returns for insurance on Compound deposits are the difference between the uninsured yield and insured yield. Returns for call and put options for other assets can be viewed from the 'Earn Premiums' and 'Earn (Annualized ROI)' columns.

The premiums that can be earned on the collateral provided are quite lucrative. However, earning this yield does not come without risk. By selling a put option in return for yield, the option seller assumes the risk that an adverse event will not occur (e.g., technical risks like hacks, financial risks like Dai breaking its peg, or a run on Compound). The individual must also maintain their respective collateralization ratios to avoid liquidation.

Is Opyn safe?

Opyn has a publicly verifiable smart contract and has been audited by OpenZeppelin, a smart contract auditing firm. The full report is available here: <https://blog.openzeppelin.com/opyn-contracts-audit/>

Opyn is also non-custodial and trustless, with a reliance on incentives for it to work.

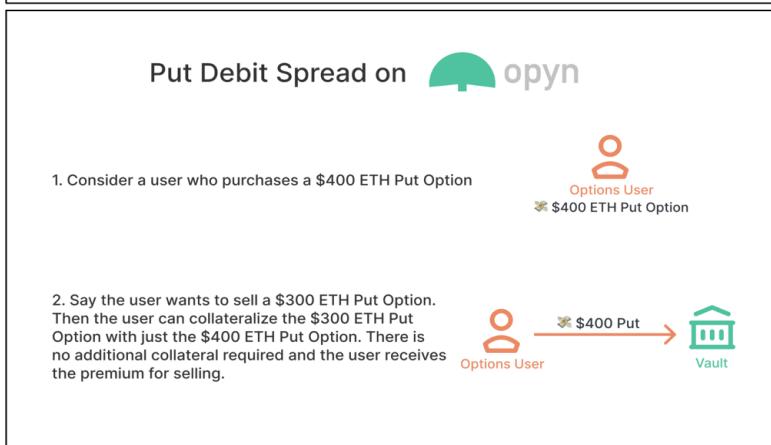
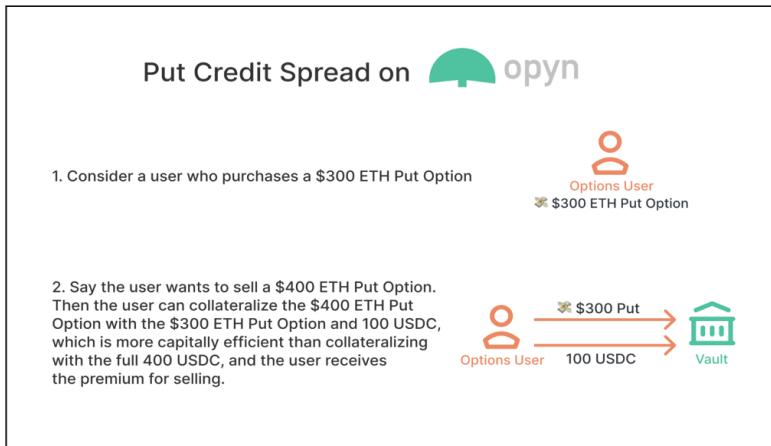
Opyn Version 2

Version 2 of Opyn was released on 30 December 2020 and is called the Gamma Protocol (Version 1 was called the Convexity Protocol). Version 2 offers European cash-settled options as opposed to physically-settled American options in version 1.

Besides the variation in the product, the latest iteration comes with a slew of additional features:

- Margin improvements

Users are allowed to create Put Credit Spreads and Put Debit Spreads, significantly improving capital efficiency



- In-the-money options are automatically exercised upon expiry
- Anyone can create new options if the asset has been whitelisted
- Yield-bearing assets (e.g., cTokens, aTokens, yTokens) can be used as collateral

Version 2 options are traded on 0x Exchange. Although Opyn version 2 has been released, version 1 is still operational. At the time of writing (April 2021), version 2 only supports options on Wrapped Ether.

Now, let's take a look at how you can purchase some put options for yourself through both versions of Opyn.

Opyn Version 1: Step-by-Step Guide



Expiry	Strike Price	Type	Current WETH Price	Protection Cost	Buy	Sell
Dec 25th 2020 16:00 GMT+8	360 USDC	Put	\$598.56	\$1.5468 / 1 WETH	Buy	Sell
Dec 25th 2020 16:00 GMT+8	400 USDC	Put	\$598.56	\$1.0988 / 1 WETH	Buy	Sell
Dec 25th 2020 16:00 GMT+8	520 USDC	Put	\$598.56	\$4.6344 / 1 WETH	Buy	Sell
Dec 25th 2020 16:00 GMT+8	550 USDC	Put	\$598.56	\$4.7551 / 1 WETH	Buy	Sell
Jan 1st 2021 16:00 GMT+8	500 USDC	Put	\$598.56	\$5.8926 / 1 WETH	Buy	Sell

Step 1

- Go to <https://v1.opyn.co/#/> and click 'Buy Protection'. We will be insuring some WETH

2

◆ Buy Protective ETH Put Option
Hedge yourself against ETH decreasing in value.

Protected WETH	Expiry	Strike Price *	Current WETH Price	Protection Cost
0 WETH	Dec 25th 2020 16:00 GMT+8	360 USDC	\$596.51	\$1.5307 / 1 WETH >
0 WETH	Dec 25th 2020 16:00 GMT+8	400 USDC	\$596.51	\$1.0873 / 1 WETH >
0 WETH	Dec 25th 2020 16:00 GMT+8	520 USDC	\$596.51	\$4.5862 / 1 WETH >
0 WETH	Dec 25th 2020 16:00 GMT+8	550 USDC	\$596.51	\$4.7056 / 1 WETH >
0 WETH	Jan 1st 2021 16:00 GMT+8	500 USDC	\$596.51	\$5.8312 / 1 WETH >

Step 2

- The ‘Buy Protection’ page lists all the assets Oyn provides options for
- Scroll to the ETH Put Options list and click ‘Buy’ on a Put option of your choosing

3

◆ Buy Protective Put Options on ETH

◆ WETH

Available Liquidity In Uniswap	164 oWETHP
Protection Cost	\$5.95 / 1 WETH
Expiry	12/25/2020
Current WETH Price	\$596.47
Strike Price *	550 USDC

Continue Purchase

Sell or Exercise

Current Payoffs *	\$0
Sell early	\$0
Exercise	\$0

If WETH is below \$550, exercise by sending your WETH and oWETHP to the protocol to receive 550 USDC per WETH up until expiry. You must click the button below to exercise. [Learn more about exercising.](#)

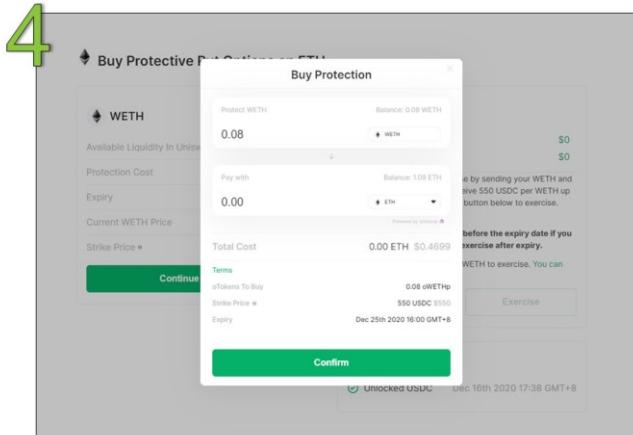
WARNING: you must exercise before the expiry date if you want to exercise. You cannot exercise after expiry.

You must convert your ETH to WETH to exercise. You can wrap ETH here.

Sell Early **Exercise**

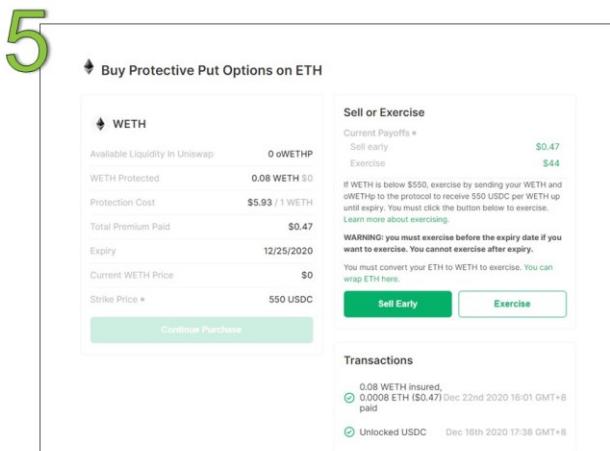
Step 3

- Selecting ‘Buy’ for any one of the Put options will provide more details
- If the ‘Continue Purchase’ button is greyed out, you may need to wrap your ETH using a DEX
- Click ‘Continue Purchase’ to proceed



Step 4

- A dialog box will appear. Set the amount of WETH to cover, as well as which asset you'd like the charge to be denominated in
- Check the details once more, and click 'Confirm' to approve the transaction



Step 5

- Once the transaction has been processed, Oyn will display the transaction.
- You are now insured against an ETH price drop!

Opyn Version 2: Step-by-Step Guide

1

Trade Options on Ethereum

Opyn allows you to earn a premium or hedge risk by trading DeFi options on ETH and ERC20s

START TRADING

Step 1

- Go to <https://opyn.co/#/> and click 'START TRADING'. We will be insuring some WETH.

2

ETH / USDC \$2245.18		Expiry					
WETH / USDC ▾		Fri, 30 Apr 2021 ▾					
CALLS ▾				PUTS ▾			
IV	Size	Breakeven	Price	Strike	IV	Size	Breakeven
▼	-	-	<input type="text"/>	\$1280	▼	232.47%	0.00 / 20.18
▼	187.56%	375.87 / 10.53	2292.35	<input type="text"/> \$532.3489 ✓	▼	-	-
▼	154.66%	376.41 / 13.59	2304.30	<input type="text"/> \$384.2969 ✓	▼	119.14%	560.88 / 42.12
▼	102.67%	375.00 / 7.80	2467.53	<input type="text"/> \$67.5336 ✓	▼	70.32%	794.40 / 32.40
▼	106.09%	449.21 / 225.79	2595.06	<input type="text"/> \$35.0613 ✓	▼	-	-
▼	25.00%	0.00 / 0.00	2720.00	<input type="text"/> \$0.0000 ✓	▼	-	-
▼	122.95%	847.20 / 502.80	2893.34	<input type="text"/> \$13.3422 ✓	▼	-	-
				\$2880			

Step 2

- Choose the intended expiry date. In this example, we chose 30-Apr-2021.
- Choose the intended strike price. We chose \$1,280.
- Click on the price

3

WEETH 4/30 Put

\$1280 Strike

BUY **SELL**

Market Limit

Position Size **0.08** oTokens

My Wallet

Option Details

Payout Analysis

Est. Total Cost 18.2321 USDC

Market Impact 0.0%

0x Protocol Fee 0.00784 ETH

Step: 1 / 2

APPROVE USDC

4

WEETH 4/30 Put

\$1280 Strike

BUY **SELL**

Market Limit

Position Size **0.08** oTokens

My Wallet

Option Details

Payout Analysis

Est. Total Cost 22.0117 USDC

Market Impact 0.0%

0x Protocol Fee 0.00945 ETH

Do not change the gas price to buy, otherwise the transaction will fail.

BUY OTOKEN

Step 3

- A new window will be shown with more details available, such as the total cost and fee breakdown.
- Key in the amount of oTokens that you would like to purchase.
- Click on the button to approve the spending of your USDC and pay the transaction fee.

Step 4

- Click 'Buy oToken'.
- You're now insured against an ETH price drop!
- If the price of ETH is below \$1,280 on 30th April 2021, we can choose to exercise our oTokens.

Recommended Readings

1. Convexity Protocol Announcement (Zubin Koticha) <https://twitter.com/snarkyzk/status/1194442219530280960>
2. Options Protocol Brings 'Insurance' to DeFi Deposits on Compound (Brady Dale) <https://www.coindesk.com/options-protocol-brings-insurance-to-defi-deposits-on-compound>
3. Getting Started (Opyn) <https://opyn.gitbook.io/opyn/>
4. Opyn launches insurance platform to protect DeFi users (Zubin Koticha) <https://medium.com/opyn/opyn-launches-insurance-platform-to-protect-defi-users-fdcabaca7d97>
5. Exploring the Decentralized Insurance Arena That's Rising on Ethereum (William Peaster) <https://blockonomi.com/decentralized-insurance-ethereum/>

CHAPTER 9: DECENTRALIZED FUND MANAGEMENT

Fund management is the process of overseeing your assets and managing its cash flow to generate a return on your investments. We have started seeing innovative DeFi teams building ways for users to better manage their funds in a decentralized manner.

Decentralized fund management is conducted without an investment manager. Instead, algorithms help you conduct trades automatically. This allows you to choose the asset management strategy that best suits your financial goals and reduces the fees paid.

To understand how fund management can work in the decentralized ledger, we will introduce you to [Token Sets](#).

TokenSets



TokenSets is a platform that allows crypto users to buy Strategy Enabled Tokens (SET). These tokens have automated asset management strategies that will enable you to easily manage your cryptocurrency portfolio without executing the trading strategy manually. With an automated trading strategy, you will not need to monitor the market 24/7 manually, thus reducing missed opportunities and risks from emotional trading.

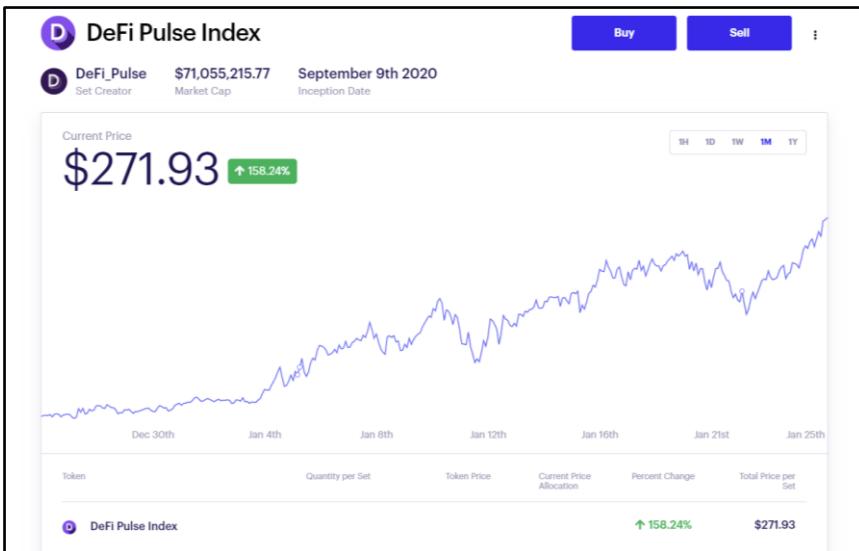
Each Set is an ERC20 token consisting of a basket of cryptocurrencies that automatically rebalances its holdings based on the strategy you choose. In other words, SET essentially implements cryptocurrency trading strategies in the form of tokens.

What kinds of Sets are there?

In our first edition, there were Social and Robo Sets. However, it has been phased out in the first quarter of 2021. There are now two kinds of Sets: (i) Index Sets, and (ii) Yield Farming Sets.

Index Sets

Index Sets allow users to have exposure to more assets and reduce gas fees by purchasing a single token instead of buying multiple assets individually. The most popular Index Set is the DeFiPulse Index (DPI), an index that tracks DeFi tokens' performance based on a market capitalization-weighted index.



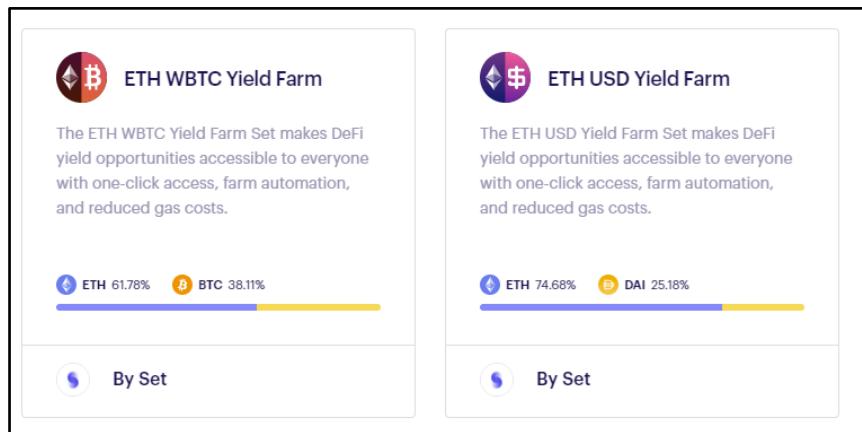
At the time of writing (April 2021), there are 14 DeFi assets under DPI:

1. Uniswap (UNI)
2. Aave (AAVE)
3. Synthetix Network Token (SNX)
4. Sushiswap (SUSHI)
5. Maker (MKR)
6. Compound (COMP)
7. Yearn.Finance (YFI)
8. REN (REN)
9. Loopring (LRC)
10. Balancer (BAL)
11. Kyber Network (KNC)
12. Harvest Finance (FARM)
13. Cream Finance (CREAM)
14. Meta (MTA)

Yield Farming Sets

Yield Farming Sets enable users to save gas by removing the need to constantly conduct multiple smart contract transactions to generate yield on yield farming protocols. These Sets' strategies will periodically claim Liquidity Provider (LP) rewards, sell them for the curated assets, and stake

those assets to generate more LP rewards. Essentially, this is an example of DeFi's take on compounding interest!



How are Sets helpful?

Sets essentially tokenize trading strategies. Suppose you are keen to try out selected trading strategies, such as purchasing a diversified basket of assets. In that case, Set is likely the easiest way to go about doing so.

That being said, always do your due diligence. Just because a Set has historically been performing well does not mean that it will continue to do so. The cryptocurrency market is highly volatile, and the old saying of “**past performance is not an indicator of future results**” is especially true here. Instead, research and compare the available strategies to see which one makes the most sense to you, and then use TokenSets to get started in no time.

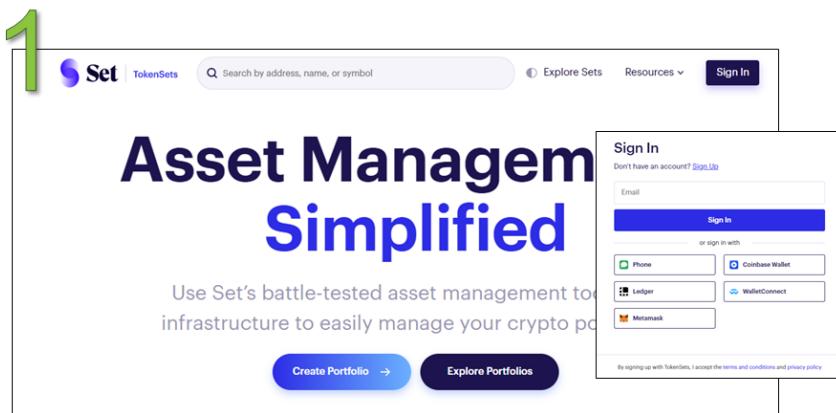
We will be going through one of the popular Index Sets as an example - the DeFi Pulse Index Set. In this case, the Index Set follows the market capitalization weighting strategy, which rebalances the set based on the market capitalization of the underlying assets. This trading strategy saw its value increase by 252% since inception (10 September 2020 – 1 April 2021).

Arguably, this Index Set may not perform as well as some of its underlying assets individually. However, it outperformed most of its underlying assets by a wide margin (11 out of 14). Unless users possess sustainable competitive

advantages on active investing, passive investing through Index Sets is the best option for a diversified exposure in the space.

That's it for TokenSets - if you are keen to get started or test it out, we have included a step-by-step guide on how to get started with Sets. Otherwise, head on to the next section to read more on the next DeFi Dapp!

TokenSets: Step-by-Step Guide



Step 1

- Go to <https://www.tokensets.com/>
- Click “Sign In” on the top right corner
- Choose sign in with Metamask or any wallet of your choice

Sets are for Asset Management

A Set is like a digital fund that trades cryptocurrencies to help grow your wealth.

• • • •

Add your email

Get alerts on TokenSet events.
Your email will be hidden from public.

Rebalances
 New Products & Features
 Portfolio Performance Updates

Enter your email

Submit

Not now

Don't show again

Step 2

- It will redirect you to a new interface
- A popup will ask for your email address. You can choose to ignore it as it is optional.

3 Set | TokenSets Explore Sets Resources Account

Explore

Explore portfolios and products created on Set Protocol.

Featured Sets

ETH 2x Flexible Leverage Index

The ETH Flexible Leverage Index lets you leverage a collateralized debt position in a safe and efficient way, abstracting its management into a simple index.

cETH 177.86% USDC -77.86%

By DeFi_Pulse

DeFi Pulse Index

The DeFi Pulse Index is a capitalization-weighted index that tracks the performance of decentralized financial assets across the market.

UNI 21.65% AAVE 18.3% +12 more

By DeFi_Pulse

Metaverse Index

The Metaverse Index captures the trend of entertainment, sports, and businesses shifting to virtual environments.

MANA 17.57% ENJ 17.55% +13 more

By IndexCoop

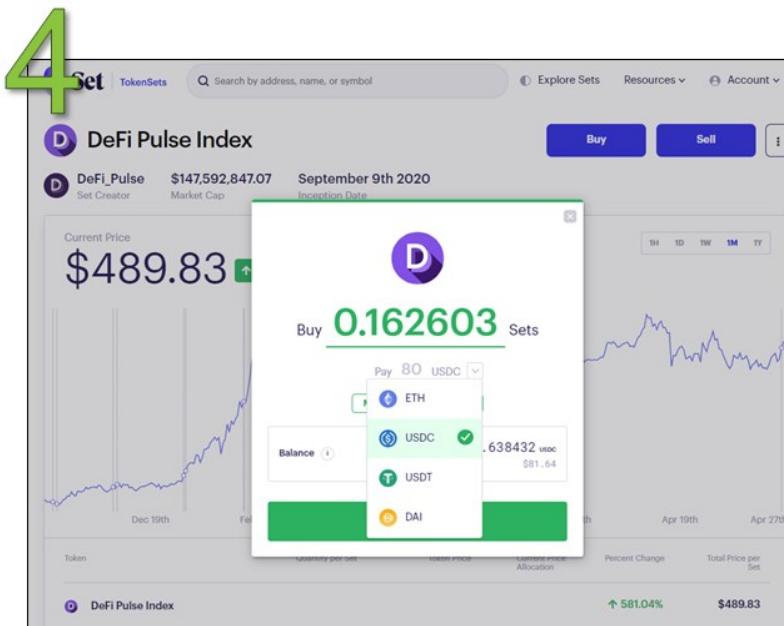
Explore All Sets

[Create A Portfolio](#) [BTC - SET](#) [ETH - SET](#) [USD - SET](#)

Name	Market Cap	Price	1 Day	1 Week	1 Month	3 Months	Since Inception
ETH 2x Flexible Leverage Index	\$37,432,113.67	\$167.81	+19.7%	+3.7%	+126.3%	-	+59.6%
			cETH 177.86% USDC -77.86%				
ETH USD Yield Farm	\$382,484.79	\$391.80	+9.7%	+16.7%	+29.4%	+65.8%	+286.3%
			ETH 83.54% DAI 16.46%				

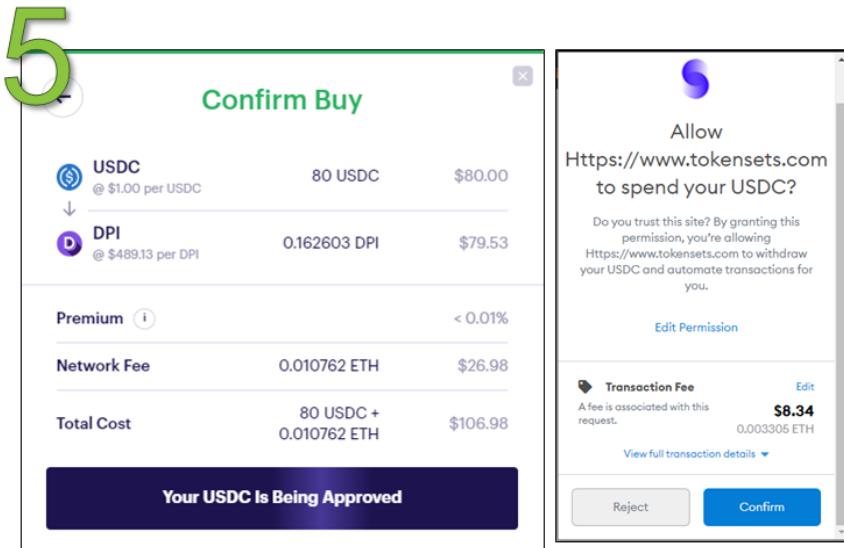
Step 3

- Eventually you will arrive at the Explore page
- You can see a list of Sets that are available.
- Index Sets typically has the word “Index” and Farm Index has the word “Farm”
- For example: “DeFi Pulse Index” and “ETH-USD Yield Farm”



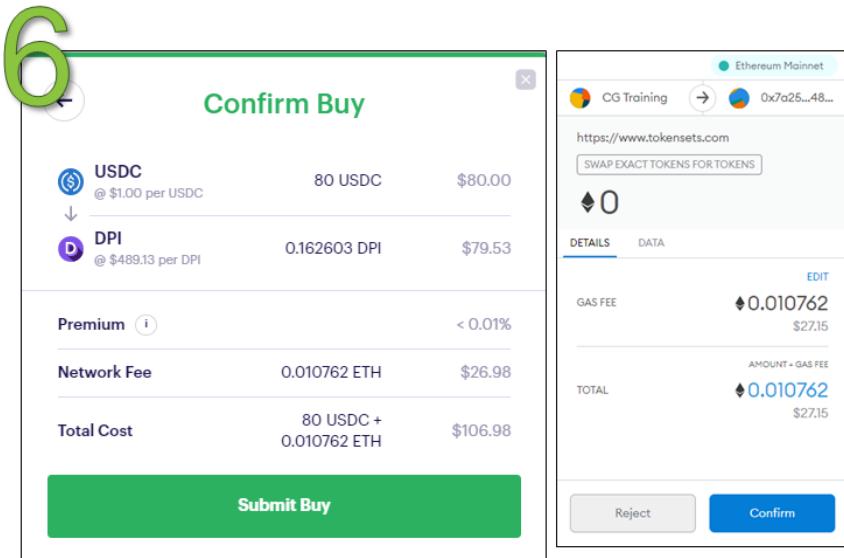
Step 4

- Let's take a look at how to buy one of the Sets. We chose the DeFi Pulse Index as an example.
- Click on DeFi Pulse from Explorer
- Then, click "Buy"
- A pop-up window will show
- You can choose to buy it with one of the four supported currencies
- We chose to buy 80 USDC (\$80) worth of DPI
- Click "Submit"



Step 5

- You will need to approve for TokenSets to spend your USDC
- Click “confirm” on your Metamask



Step 6

- Once approval confirmed, you can now submit your buy
- Another transaction approval is required
- Click “confirm” on your Metamask
- You are done!

Recommended Readings

- Automated Asset Management with Set Protocol. (Zerion)
<https://blog.zerion.io/tokensets-explained-af5771208860?gi=3beb1e590e6f>
- DeFi10 Part 1: Lessons in Building a DeFi Portfolio
<https://thedefiant.substack.com/p/defi10-part-1-lessons-in-building>
- DeFi10 Part2: Becoming a Programmable Money Fund Manager
<https://thedefiant.substack.com/p/defi10-part2-becoming-a-programmable>
- Returns of Hodling versus DeFi-ing (Evgeny Yurtaev)
<https://blog.zerion.io/returns-of-holding-vs-defi-ing-c6f050e89c8e>

CHAPTER 10: DECENTRALIZED LOTTERY

Thus far, we have gone through various protocols for stablecoins, decentralized exchanges, swaps, and derivatives - all of them serious stuff. In this section, we will introduce something light and fun - a decentralized, no-loss lottery.

In [February 2020](#), a user who had deposited only \$10 had won \$1,648 in PoolTogether's weekly DAI Prize Pool, a 1 in 69,738 chance of winning. The best part of PoolTogether's lottery is that participants can get a refund of the \$10 deposit if they did not win. There is no loser in this game, but only opportunity cost involved. Read on to find out more.

PoolTogether



What is PoolTogether?

PoolTogether is a decentralized no-loss lottery or decentralized prize savings application where users get to keep their initial deposit amount after the lottery prize is drawn. Instead of funding the prize money using the lottery tickets purchased, the prize money is funded using the interest earned on Compound protocol by the pooled user deposits. For each round of PoolTogether, all the user deposits are sent to Compound to earn interest. One lucky winner will be selected at random at the end of each interval to win the entire interest accumulated as prize money.

Participating in PoolTogether is relatively straightforward - simply “purchase” PoolTogether tickets using DAI, USDC, UNI, or COMP tokens. Each ticket represents one entry, and the chance of winning increases proportionately with the number of tickets purchased.

PoolTogether currently supports four different lotteries - a weekly DAI, USDC, UNI, and COMP pool. Sponsors can provide additional rewards in the form of any tokens to the pool, and this is known as Loot Box. In terms of security, PoolTogether has gone through several security audits to review their codes.

This concept is not new, and it is similar to [Prize-Linked Savings Account \(PLSA\)](#), where it incentivizes people to save more in their bank’s savings account by providing sweepstakes for lucky winners. PLSA is a popular concept, with banks and credit unions worldwide offering such programs.

One of the best-known PLSA programs is the “Save to Win” program by Michigan Credit Union League.⁴

Why bother with Decentralized Lotteries?

One of the attractions of decentralized lotteries is that funds do not go through intermediaries or brokers but are instead held by audited smart contracts. There is also no lock-up period on funds, meaning that users can withdraw their funds at any moment. Furthermore, the prize draw can be verified on-chain in Ethereum to make sure there is no manipulation.

Traditionally, the protection laws of the gambling industry have made real-world no-loss lottery, such as PLSA programs, restrictive to users from certain geographical areas to join. This is where Decentralized Applications genuinely shine - anyone from anywhere can participate if they have the funds to do so.

What's the Catch?

Surely there can't be free money? Spot on! There's a small catch - the opportunity cost of putting your funds into PoolTogether. If you place your funds into Compound to supply liquidity, you will earn interest from it.

However, if you put your funds into PoolTogether, you will lose the interest earned from Compound. Instead, you now have the opportunity to win the lottery. Effectively, your “fee” to enter the lottery is whatever interest you would have earned by lending it out on Compound.

What are the odds of winning?

The odds of winning depend on the number of tickets purchased. For example, if there are 1,000 tickets in the pool and you buy one ticket, your chance of winning would be 1 in 1,000. You can always check your odds of winning on the PoolTogether account page.

What's new in PoolTogether's Version 3?

Now anyone can create their own no-loss prize pool using PoolTogether with support for any ERC 20 tokens. Plus, the protocol has chosen to

⁴ “What Are Prize-Linked Savings Accounts? - The Balance.” 21 Feb. 2019, <https://www.thebalance.com/what-are-prize-linked-savings-accounts-4587608>.

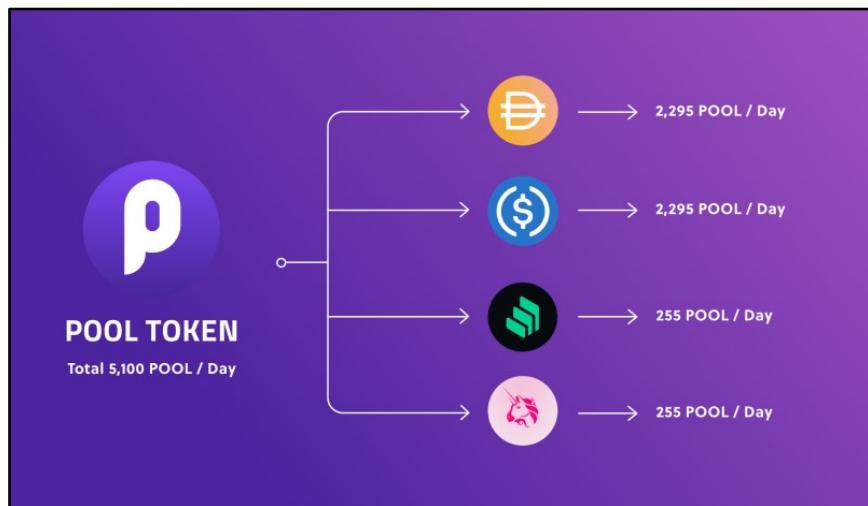
support other yield sources, such as Yearn Finance and Aave, in addition to Compound lending. So now the prize money can be funded using different yield sources.

PoolTogether Token

The governance token for PoolTogether protocol - POOL was released on 18 February 2021. 14% of the total supply was given to all depositors before 14 January 2021. It was a great surprise to the readers of our book that has managed to use the platform.

The airdrop was given based on the amount deposited and how long it has stayed in the pool. For example, one of our colleagues who deposited only 5 DAI for two months was awarded 300 POOL. With an initial trading price of roughly \$20, the airdrop was worth approximately \$6,000.

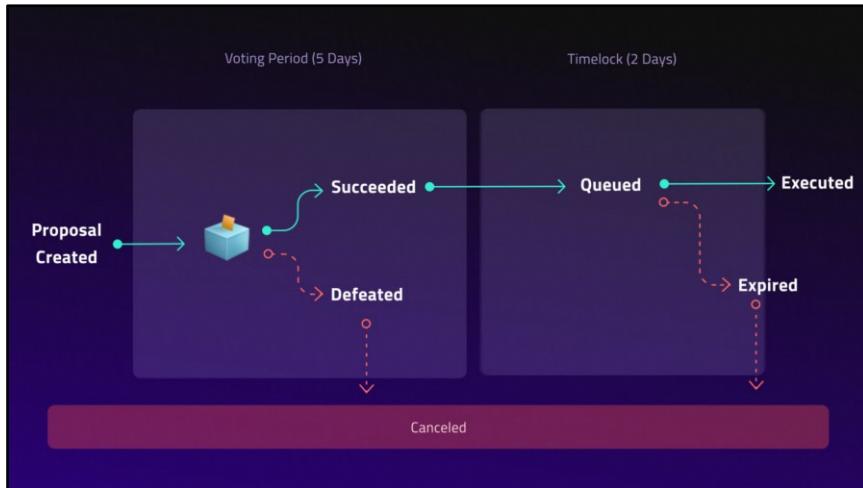
As part of the liquidity mining program, 5% of the total supply will be distributed to all depositors over 14 weeks starting from 17th February 2021. That's a prize pool of 5,100 POOL per day i.e., \$102K per day!



57.54% of the supply is placed under protocol treasury, where the usage will be determined by governance. For example, POOL token holders can vote on:

- Creating a referral program
- Setting up liquidity mining program in the future
- Setting up a grants program

PoolTogether Governance



To submit a governance proposal, users will have to either hold 10,000 POOL tokens (0.1% of total supply) or have 10,000 POOL tokens delegated to them. There is a five-day voting period. With a 1% quorum (at least 100,000 votes are casted), the proposal is considered passed with majority in favor. The proposal will be implemented after a two days timelock.

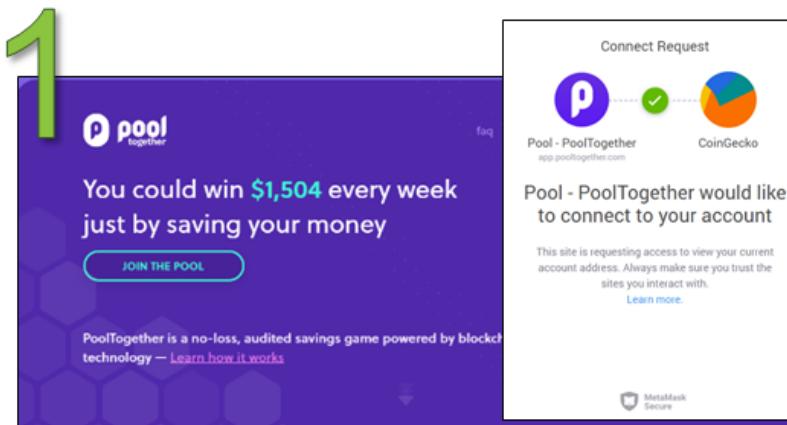
To receive delegation, users will have to delegate themselves on the [Sybil governance website](#).

At first, POOL token holders will be able to vote on:

- Adjust the number of winners for a prize pool
- Adjust the prize frequency
- Approve new prize strategies
- Launch new prize pools

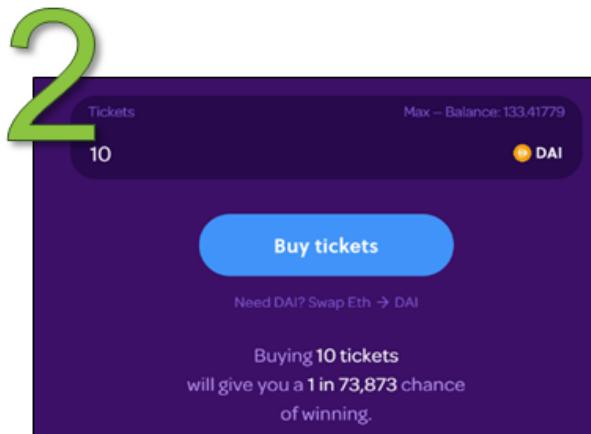
If you're keen to get started or test it out, we have included a step-by-step guide on using PoolTogether. Otherwise, head on to the next section to read more on the next DeFi Dapp.

PoolTogether: Step-by-Step Guide



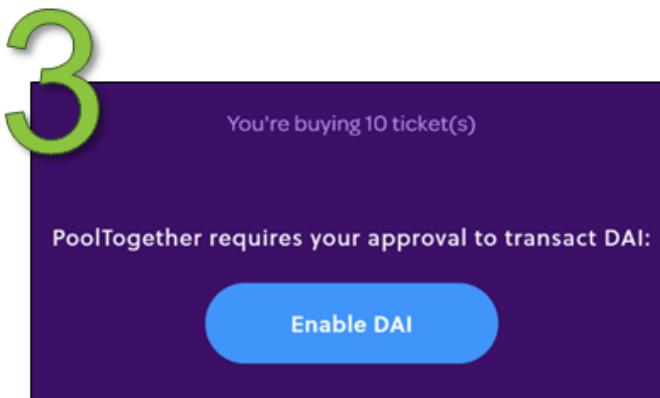
Step 1

- Go to <https://www.pooltogether.com/>
- Connect your wallet Make sure you have DAI, USDC, UNI, or COMP token. We will be using DAI in this example



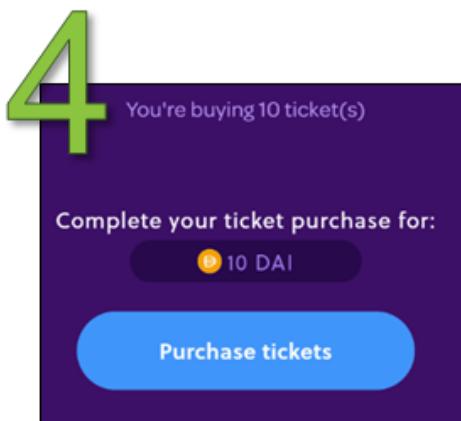
Step 2

- Insert the number of tickets you wish to purchase
- Note: 1 ticket costs 1 DAI and represents 1 entry. Your probability to win goes up with more entries



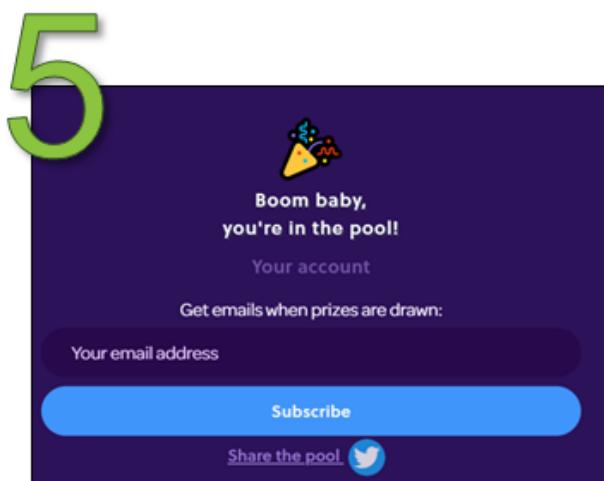
Step 3

- First-time buyer will need to enable DAI



Step 4

- You continue with the purchase afterward



Step 5

- DONE! Just wait for PoolTogether to announce the winner every week

Recommended Readings

1. A Simple Explanation of Risks Using PoolTogether (PoolTogether)
<https://medium.com/pooltogether/a-simple-explanation-of-risks-using-pooltogether-fdf6fec3864>
2. How PoolTogether Selects Winners
<https://medium.com/pooltogether/how-pooltogether-selects-winners-9301f8d76730>
3. No Loss Lottery Now Holds \$1 Million Tokenized Dollars
(TrustNodes) <https://www.trustnodes.com/2020/01/29/no-loss-lottery-now-holds-1-million-tokenized-dollars>
4. PoolTogether - Prize Linked Savings Account (Nick Sawinhy)
<https://defiprime.com/pooltogether>
5. How PoolTogether Turns Saving Money Into a Game (Binance)
<https://www.binance.vision/tutorials/how-pool-together-turns-saving-money-into-a-game>
6. Leighton Cusack Explains How PoolTogether, a No-Loss Lottery Works - Ep. 6 (CoinGecko Podcast)
<https://podcast.coingecko.com/719703/2879608-leighton-cusack-explains-how-pooltogether-a-no-loss-lottery-works-ep-6>
7. A data-driven look inside Pool Together (TokenAnalyst)
<https://research.tokenanalyst.io/a-look-inside-pool-together/>

CHAPTER 11: DECENTRALIZED PAYMENTS

One can already make decentralized payments by sending ETH or DAI directly to the receiver. Now make it better - think cheaper and faster transactions, timed transfers, transfer by conditions, standardized invoicing formats, and more. Some of the more notable projects working on decentralized payments are [Lighting Network](#), [Request Network](#), [xDai](#) and [Sablier](#).

In this chapter, we will be exploring Sablier, a project which we find interesting and can solve some of the outstanding issues for people who are vulnerable in society.

Sablier



What is Sablier?

Sablier is a payment streaming application—meaning that it allows payment and withdrawals to be made in real-time and in small increments (by the second!) between different parties. Think about payments for hourly

consultation work, daily contract workers, or monthly rent payments made in real-time as work and progress are being made. Similar to how you can stream music on Spotify, you can now also stream money on Sablier!

What Does Streaming Payment Mean?

Instead of waiting for a fixed period (e.g., monthly, bi-weekly) for pay, payers can now send payments in real-time in periods defined and agreed upon by both parties. Through Sablier, payees can now receive their payment in real-time and withdraw it whenever they want to.

Why is this important?

We think that Sablier has the potential to help those who live paycheck to paycheck. These people are most vulnerable to delays in their income, where even a few days of delay would mean that they do not have the means to put food on the table.

When that happens, they often resort to payday loans—short-term, uncollateralized loans with very high interest rates (up to 500% APR).⁵ With astronomical interest rates and limited income, payday loan borrowers are especially susceptible to debt spirals—one that has seen many arrested in the US for being unable to repay their loan.⁶

Trust

Streamed payment can be beneficial for new, remote contract workers who, prior to this, had to trust their new employers to pay them for the work they do. When both parties sign a contract through Sablier, they will know that payments are being made, and both parties can verify the payments in real-time.

Timing

Traditionally, salary payments are made monthly or bi-weekly, but there may be instances where funds are required immediately - and payment streaming can help with this. A salaried employee does not have to wait till payday to

⁵ “Payday Loans: Disadvantages & Alternatives - Debt.org.” <https://www.debt.org/credit/payday-lenders/>

⁶ “People are arrested after falling behind on payday loans.” 23 Feb. 2020, <https://www.cnbc.com/2020/02/22/people-are-arrested-after-falling-behind-on-payday-loans.html>. Accessed 24 Feb. 2020.

access his remuneration - he can withdraw as much as he has earned to date, which may resolve immediate concerns. Furthermore, this is also helpful to avoid delays. Even if a worker fully trusts his employer, streaming paychecks guarantees that the payout will be made in full at the end of the period!

Example of how it works

Imagine you provide online consultancy services for a fee of \$60 per hour (\$1 per minute). To begin with, you will likely have to think about whether to:

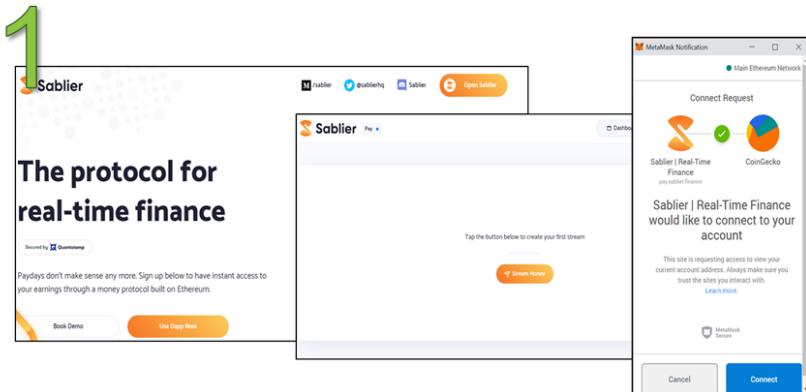
1. Collect payment upfront. However, this may be off-putting to some new clients, or
2. Collect payment later, meaning you will have to trust your client to pay you, or
3. Use an escrow service or platform to protect both sides for a commission.

With the advent of payment streaming, you will no longer need to trust either party. **You can be paid on a minute basis to ensure that you and your clients both get their money's worth and that if they do try to run away from paying, you will lose only 1 minute of your time. Essentially, the “trust” part of an online transaction has been shifted from a person to lines of immutable code (the blockchain & smart contract).**

This is what Reuben Bramanathan, a cryptocurrency and blockchain consultant, [did to charge](#) his client for a 30-minute consultation.

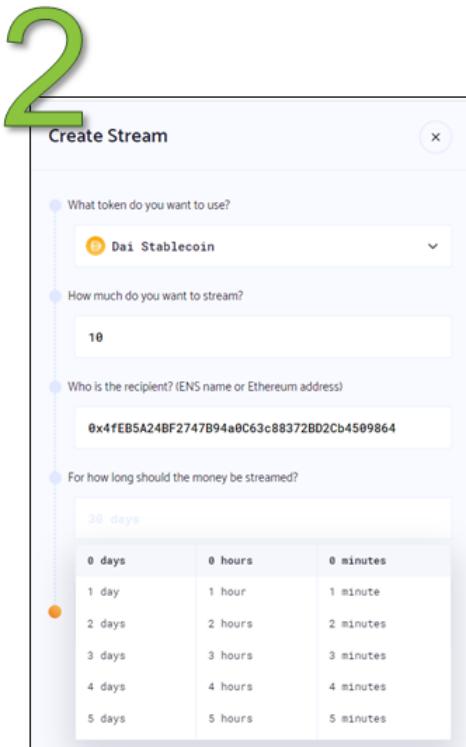
For those curious about making streaming payments, we have included a step-by-step guide on how to get started with Sablier. The process is simple and straightforward.

Sablier: Step-by-Step Guide:



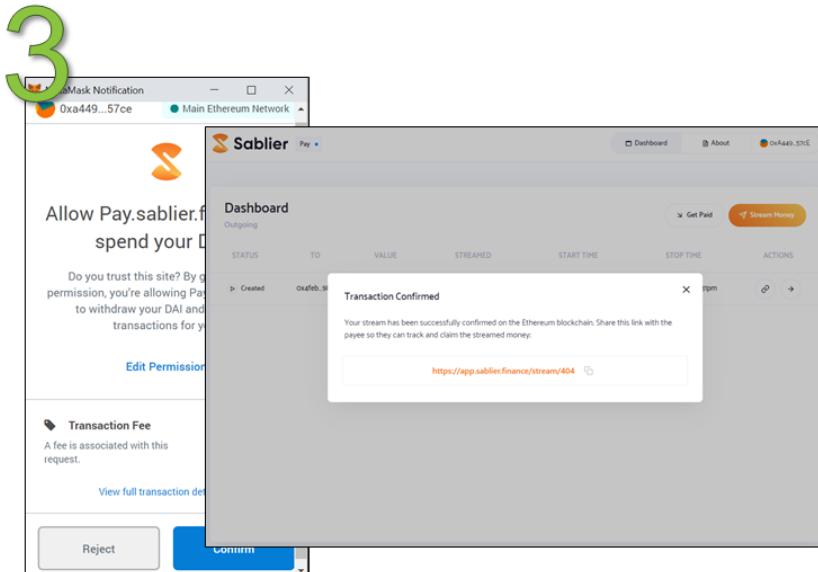
Step 1

- Go to [Sablier](https://sablier.finance) and click 'Use Dapp Now'
- You will be redirected to pay.sablier.finance.
- Sign in with your Ethereum wallet



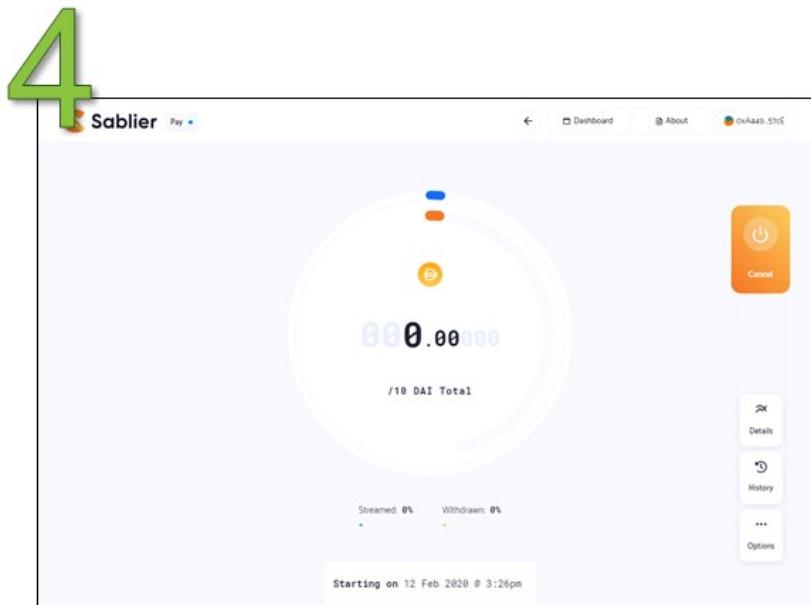
Step 2

- After clicking on 'Stream Money', select a token from the dropdown
- Type an amount (which will be refunded if the stream finishes earlier)
- Type an ENS domain or Ethereum address
- Select a duration, e.g. 30 day



Step 3

- Confirm your transaction



Step 4

- After the blockchain validates your transaction, you will be shown a payment link
- Share this with the owner of the ENS domain/Ethereum address from before

Conclusion

Decentralized payment platforms improve the way we pay for services and products, utilizing the power of blockchain technology to deliver real-time payment streams in a ‘trustless’ manner. Such functionality paves the way for new forms of employee-employer and producer-consumer relationships. Furthermore, in today’s environment where contract work agreements are increasingly prevalent and where any shortfall in income could prove detrimental, these platforms can help facilitate better financial and personal outcomes for parties on both ends of a transaction.

Recommended Readings

1. Sablier v1 is Live (Paul Razvan Berg)
<https://medium.com/sablier/sablier-v1-is-live-5a5350db16ae>
2. Sablier The protocol for real-time finance (State of the Dapps)
<https://www.stateoftheDapps.com/Dapps/sablier>
3. Building with Sablier (Sablier)
<https://twitter.com/SablierHQ/status/1214239545220386819?s=19>
4. DeFi Dive: Sablier – the protocol for real-time finance on Ethereum
<https://defipulse.com/blog/defi-dive-sablier-protocol/>

CHAPTER 12: DECENTRALIZED INSURANCE

To participate in DeFi, one has to lock tokens in smart contracts. Tokens locked in smart contracts are potentially vulnerable to smart contract exploits due to the large potential payout. While most projects have gotten their codebases audited, one will never know if the smart contracts are truly safe. There is always a possibility of a hack which may result in a loss.

One of the highest-profile exploits involved a DeFi Dapp known as bZx. The platform suffered two breaches in February 2020 and another in September 2020. The first exploit on 15 February 2020 resulted in a loss of 1,193 ETH (\$318,000) while the second exploit on 18 February 2020 saw 2,388 ETH (\$636,000) lost.⁷ Finally, on 13 September 2020, bZx was hacked the third time, losing \$8.1 million, nearly 30% of its total value locked.⁸ In all, bZx experienced a loss of almost \$10 million in 2020. These breaches involved highly complex transactions involving multiple DeFi Dapps.

More hacks have occurred since then. The fourth quarter of 2020 saw no less than five high-profile attacks against several popular DeFi Dapps. In October 2020, Harvest Finance, a yield farming protocol, was attacked by a hacker who withdrew \$50 million through flash loans. Subsequently, in

⁷ (2020, February 18). Decentralized Lending Protocol bZx Hacked Twice in a Matter Retrieved December 16, 2020, from <https://cointelegraph.com/news/decentralized-lending-protocol-bzx-hacked-twice-in-a-matter-of-days>

⁸ (2020, September 14). DeFi Protocol bZx Hacked For Third Time, Loses \$8 Million Retrieved December 16, 2020, from <https://decrypt.co/41718/defi-protocol-bzx-hacked-for-third-time-loses-8-million>

November, Akropolis, Value DeFi, Origin Protocol, and Pickle Finance all suffered varying degrees of security breaches. Altogether, the attacks amounted to a staggering \$69 million loss for the DeFi space. These hacks show that exploits can still occur even though these Dapps had been audited beforehand.

The potential for such massive losses highlights the inherent risks in DeFi and is something that many people do not pay close attention to. Here are some of the risks that DeFi users face:

1. Technical Risks - where smart contracts could be hacked or bugs could be exploited
2. Liquidity Risks - where lending protocols (e.g., Compound) could run out of liquidity
3. Admin Key Risks - where the master private key for the protocol could be compromised

The risks highlight the need for purchasing insurance if one is dealing with large amounts on DeFi. This section will cover two major providers of decentralized insurance to help you protect your DeFi transactions, namely Nexus Mutual and its broker, Armor. Additionally, we also briefly highlight other insurance platforms such as NSure Network and Cover Protocol.

Nexus Mutual



What is Nexus Mutual?

Nexus Mutual is a decentralized insurance protocol built on Ethereum that offers cover for smart contracts on the Ethereum blockchain and custody cover for centralized lenders and exchanges such as Celsius, Blockfi, Nexo, Binance, Coinbase, Kraken, and Gemini. As of December 2020, Nexus

Mutual provides cover for 64 smart contract protocols. Here's a list of some of the more prominent Dapps they cover:

Selected Nexus Mutual Supported DeFi Smart Contracts (Dec 2020)			
No.	DeFi Smart Contract	No.	DeFi Smart Contract
1	MakerDAO	18	Compound
2	Moloch DAO	19	Uniswap v1
3	Nuo	20	Uniswap v2
4	Gnosis	21	Paraswap
5	0x	22	SushiSwap
6	Tornado Cash	23	Yearn Finance
7	Uniswap	24	Cover Protocol
8	Argent	25	Opyn
9	dYdX	26	Celcius
10	Set Protocol	27	Hegic
11	Fulcrum	28	C.R.E.A.M.
12	Aave v1	29	Akropolis Delphi
13	Aave v2	30	Yam Finance
14	Edgeware	31	Bancor Network
15	IDEX	32	Balancer
16	Instadapp	33	Synthetix
17	DDEX	34	Pool Together

What event is covered by Nexus Mutual?

Smart Contract Cover offers coverage against smart contract failures, protecting against potential bugs in smart contract code. The coverage intends to protect against financial losses due to hacks or exploits in the smart contract code. Note that this insurance product only protects against “unintended uses” of smart contracts. Security events that occur through negligence (such as the loss of private keys) are not covered.

Custody Cover aims to protect users who put funds into organizations that hold user funds and assets, such as centralized exchanges and centralized borrowing/lending platforms. Users will be covered in events where:

1. The custodian gets hacked and the user loses more than 10% of their funds, or
2. Withdrawals from the custodian are halted for more than 90 days.

How does coverage work?

Users must first apply to become a member of Nexus Mutual to obtain coverage. Once approved, users can select the Cover Amount and Cover Period for a chosen protocol's smart contract.

The Cover Amount is the amount that users would like to purchase cover for and will be the amount that will be paid out in case there are smart contract failures. The Cover Period is the length of time for which the Cover Amount will be active.

Upon a smart contract failure incident, a Claims Assessment process will take place which Claims Assessors will evaluate. Once the Claims Assessors have approved the Claims Assessment, the user will receive the Cover Amount.

How is the coverage priced?

While all smart contracts can be covered by Nexus Mutual, the price of Smart Contract Cover is based on several criteria such as:

1. Cover Amount
2. Cover Period
3. Value staked by Risk Assessors against the smart contract

For example, let's say you buy 5 ETH worth of cover for the Compound smart contract when ETH is \$200. Assuming the coverage is 0.013 ETH per 1 ETH of coverage for a year, this would cost you a total of 0.065ETH for a year of coverage.

If Compound gets hacked during this period, you will be able to get back 5 ETH regardless of the price of ETH during the time of the hack. If ETH has risen to \$300 during the hack, you would still receive back 5 ETH as long as your claim is approved.

How to Purchase Cover?

1. Specify which smart contract address you want cover for.
2. Specify the Cover Amount, currency (ETH or DAI) and Cover Period.
3. Generate a quote and process the transaction using an Ethereum wallet such as Metamask.
4. You are now covered!

NXM Token

Nexus Mutual has its native token known as NXM. The NXM token is used to buy cover, vote on governance decisions, and participate in Risk and Claims Assessments. It is also used to encourage capital provision and represents ownership to the mutual's capital. As the mutual's capital pool increases, the value of NXM will increase as well.

The token's price is determined using a bonding curve, which is affected by the amount of capital the mutual has and the amount of capital that the mutual needs to meet all claims with a certain probability.

The NXM token is not traded on any exchange and is only used as an internal token for Nexus Mutual. To obtain the NXM token, one must register as a Nexus Mutual member and go through the platform's KYC and AML processes. Users need to pay a one-time membership fee of 0.002 ETH when signing up. Once approved, members can then obtain coverage and enjoy all the benefits that the NXM token provides.

Through a partnership with Armor, users can also buy coverage without going through the KYC processes mentioned above. We will explain further about Armor below.

wNXM Token

wNXM is a 'wrapped' version of the NXM token. In contrast to NXM, wNXM is freely transferable and can be bought on the open market through cryptocurrency exchanges.

To make use of the wNXM token, it first needs to be unwrapped into NXM by a registered Nexus Mutual member. Once unwrapped, wNXM becomes NXM and can be used as usual on the Nexus Mutual platform.

What is a Risk Assessor?

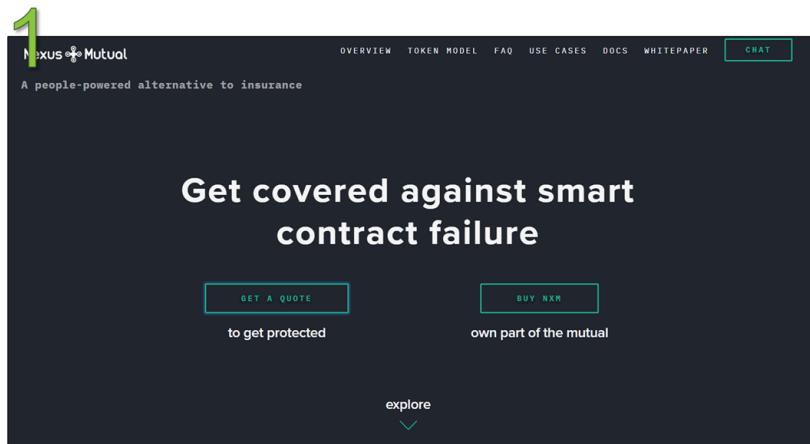
A Risk Assessor is someone who stakes value against smart contracts (essentially vouching that the smart contract is safe). The Risk Assessor is incentivized to do so as the Risk Assessor can earn NXM rewards when users take cover on their staked smart contracts. A Risk Assessor would be someone who understands the risks in Solidity smart contracts and either:

- (1) Assesses individual Dapps themselves, or
- (2) Trusts someone who says the contract is secure (like an auditor or other stakers)

Has NXM ever paid out claims before?

Yes! In the case of the bZx flash loan exploit in February 2020, six members were covered for up to \$87,000. Three claims submitted by these members were accepted for an overall payout of \$34,996. The claims were disbursed immediately after Risk Assessors voted to accept their claims.

Nexus Mutual: Step-by-Step Guide



Step 1

- Go to <https://nexusmutual.io/> and click get a quote

2

Buy cover

Select project Get quote Membership Confirm

Show Smart contracts Custodians

Search e.g. Compound

Project 1: Cover Protocol
Project type: Smart contract
Yearly cost: 37.79%
Capacity: 156 ETH / 91.1k DAI
Select

Project 2: Sushiswap
Project type: Smart contract
Yearly cost: 31.09%
Capacity: 274 ETH / 160.5k DAI
Select

Project 3: Aave V2
Project type: Smart contract
Yearly cost: 7.02%
Capacity: 1.2k ETH / 683.3k DAI
Select

Project 4: Celsius
Project type: Custodian
Yearly cost: 2.60%
Capacity: 4k ETH / 2.4m DAI
Select

Project 5: BlockFi
Project type: Custodian
Yearly cost: 2.60%
Capacity: 3.7k ETH / 2.1m DAI
Select

Project 6: Nexo
Project type: Custodian
Yearly cost: 7.63%
Capacity: 2.5k ETH / 1.5m DAI
Select

Project 7: inLock
Project type: Custodian
Yearly cost: 34.72%
Capacity: 435 ETH / 254.4k DAI
Select

Project 8: Lend
Project type: Custodian
Yearly cost: 34.31%
Capacity: 448 ETH / 262k DAI
Select

Step 2

- Choose a smart contract platform that you would like cover for. We chose Uniswap v2

3

Buy cover

Select project Get quote Membership Confirm

Cover details

Amount: 1 ETH
Period: 30 DAYS

You're covered for the following events:
• bugs in the solidity code that lead to a material loss of your funds
Check out full details here.

Summary

Uniswap V2
Yearly cost: 2.60%
Capacity ETH: 9389 ETH
Capacity DAI: 5482928 DAI
Get quote

Step 3

- Fill in the cover amount and period. The minimum cover amount is 1 ETH or 1 DAI, whereas the cover period ranges from 30-365 days
- When done, click 'get quote'

The screenshot shows the Nexus Mutual insurance platform. At the top, a large green '4' indicates the step. Below it, the page title is 'Buy cover'. A horizontal progress bar shows the steps: 'Select project' (green), 'Get quote' (light blue), 'Membership' (green, currently active), and 'Confirm' (light blue). The main content area is titled 'Membership Fee' and includes three sections: 'Agreement', 'Legal Entity', and 'KYC / AML'. The 'Agreement' section contains text about being part of the mutual and includes a 'Required' label. The 'Legal Entity' section contains text about Nexus Mutual being a blockchain-based organization and includes a 'Required' label. The 'KYC / AML' section contains text about verifying identity and includes a 'Required' label. To the right, a 'Summary' box shows the following details: **Uniswap V2**, Cover amount: 1 ETH, Cover period: 30 days, Quote NXM: 0.0556 NXM, and Quote ETH: 0.0021 ETH. A green 'Continue' button is at the bottom of the summary box.

Step 4

- After the quote has been generated, Nexus Mutual will show the cost of coverage. In addition, the platform will prompt you to sign up to be a member
- To become a member, you will need to:
 - Not be a resident in the following countries: China, Mexico, Syria, Ethiopia, North Korea, Trinidad and Tobago, India, Russia, Tunisia, Iran, Serbia, Vanuatu, Iraq, South Korea, Yemen, Japan or Sri Lanka
 - Complete KYC and AML
 - Pay a one-off membership fee of 0.002 ETH
 - Once your membership is approved, you can proceed to buy your insurance

5

Buy cover

Select project

Payment options

Quote ETH: 0.0259 ETH

Quote NXM:

Buy cover using

Summary

Uniswap V2

Cover amount: 1 ETH

Cover period: 365 days

Amount due: 0.0259 ETH

Grant TokenController permission over

Agreement

I agree that this cover is not a contract of insurance. Cover is provided on a discretionary basis with Nexus Mutual members having the final say on which claims are paid.

Step 5

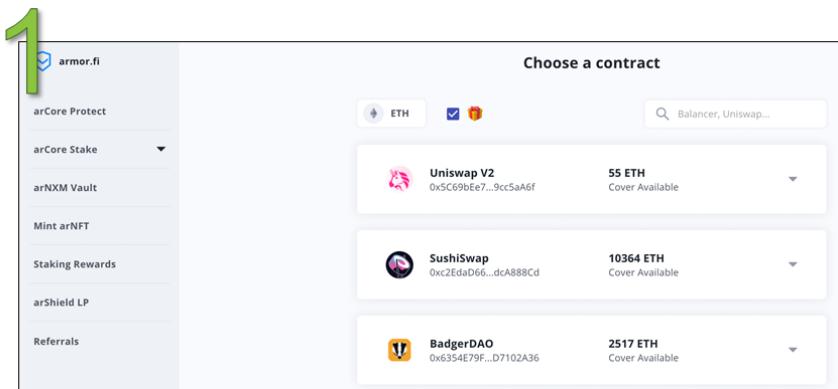
- Tick the agreement box if all the displayed details are accurate
- Grant permission to Nexus Mutual to connect to your wallet and click 'buy cover'
- You have just bought some insurance!

Armor

Armor is the first insurance aggregator for DeFi. Leveraging the underwriting capability of Nexus Mutual, it offers pay-as-you-go insurance products and the ability to buy insurance covers without KYC.

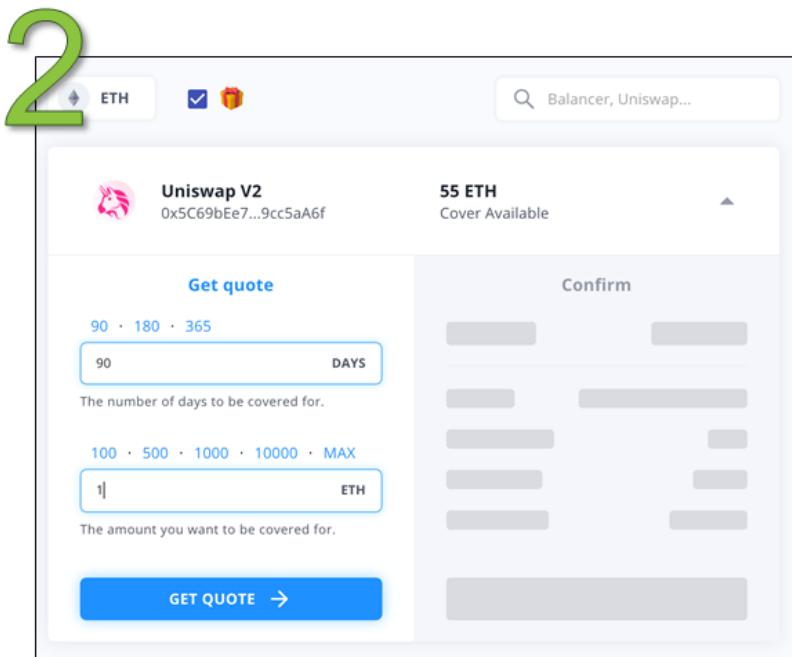
Users who do not want to undergo KYC or cannot purchase cover due to Nexus Mutual's geographical restrictions can obtain coverage through Armor.

Armor: Step-by-Step Guide



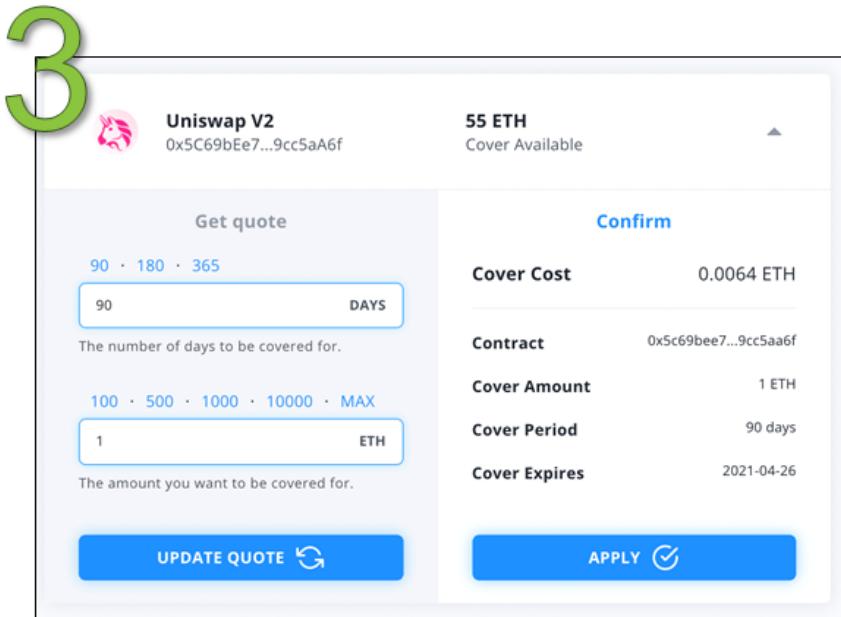
Step 1

- Go to [Armor.fi](https://armor.fi) and click 'mint arNFT'



Step 2

- Choose the smart contract you would like cover for. We chose Uniswap v2 again. Fill in the cover period and amount.
- Click 'Get Quote'



Step 3

- Armor will generate a quote. Click apply and authorize the transaction through your wallet.
- You have just bought some insurance!

Other Insurance Platforms

As the DeFi space develops and matures further, the complexity of transactions and propensity for Dapps to execute 'money lego' interactions increases. Money lego is a concept that describes DeFi architecture that is highly composable and interoperable; Protocols can be built atop each other, leveraging the existing services offered rather than building it out independently. However, high composability can be a double-edged sword as it introduces systemic risk as now a failure can potentially affect more protocols. This natural progression will continue to bring greater decentralization and innovation while at the same time magnifying potential technical, financial, administrative, and smart contract risks.

Addressing these potential risks and protection gaps will remain a challenge for the foreseeable future due to the nascent nature of DeFi. In this section,

we will briefly discuss two more insurance platforms that have recently entered the DeFi insurance space - Nsure Network and Cover Protocol.

Nsure Network



Nsure Network is a decentralized insurance project that borrows the idea of Lloyd's of London, a marketplace to trade insurance risks. Prices for premiums are determined using a Dynamic Pricing Model where capital supply and demand jointly determine the premiums, similar to the free market's pricing mechanism.

Nsure Network's governance tokens (NSURE) are backed by the policies purchased. The price is self-adjustable to the movement of capital supply and demand but is subject to being stabilized by the underlying model. Unlike Nexus Mutual that follows a mutual model, Nsure Network follows a shareholders model where the Nsure Network's tokens are akin to holding a share of the network.

Cover Protocol



Cover Protocol is a peer-to-peer insurance marketplace that operates similarly to a prediction market. Unlike other insurance protocols, the governance token is not used for underwriting risk.

To bootstrap coverage for this new protocol, market makers are incentivized to stake DAI or yDAI collateral to mint CLAIM and NOCLAIM tokens. Cover Protocol insurance covers a selected protocol, and all have a specified expiry date. During the expiry date, either CLAIM or NOCLAIM tokens will have the full claim to the collaterals.

For example, if 100 DAI is used to provide coverage for the Compound protocol until a set expiry date, it will yield 100 CLAIM and 100 NOCLAIM tokens. On the expiry date, if there is a valid claim event, all CLAIM tokens will receive 1 DAI while all NOCLAIM tokens will expire worthless. Conversely, if there is no valid claim event, all NOCLAIM tokens will receive 1 DAI while all CLAIM tokens expire worthless.

To have 100 DAI worth of insurance coverage, users will need to purchase 100 CLAIM tokens from an exchange, as this will expire to 100 DAI in the event of a valid claim. The cost of buying the 100 CLAIM tokens will be the insurance premium.

Conclusion

Insurance is still a very niche segment in DeFi and generally attracts very few retail market participants. However, as more sophisticated players join the market, they will undoubtedly demand better risk management tools.

At the end of the day, the choice to insure or not to insure is ultimately up to you. However, we at CoinGecko would definitely recommend purchasing insurance as anything can happen in DeFi.

Recommended Readings

1. A guide to financial risk in DeFi (Seth Goldfarb)
<https://defiprime.com/risks-in-defi>
2. Nexus Mutual NXM Token Explainer (Hugh Karp)
<https://medium.com/nexus-mutual/nexus-mutual-nxm-token-explainer-b468bc537543>
3. Nexus Mutual (Fitzner Blockchain)
<https://tokentuesdays.substack.com/p/nexus-mutual>
4. The Potential for Bonding Curves and Nexus Mutual (Fitzner Blockchain) <https://tokentuesdays.substack.com/p/the-potential-for-bonding-curves>
5. Why Nexus Mutual should be on your radar (DeFi Dad)
https://twitter.com/DeFi_Dad/status/1227165545608335360?s=0
6. Cover Protocol - Decentralized Insurance Marketplace
<https://defiprime.com/cover-protocol>
7. Armor.fi Living Documentation <https://armorfi.gitbook.io/armor/>
8. Total coverage sold breached \$800 mil only one month after launch
<https://twitter.com/ArmorFi/status/1365872579119108098?s=20>

CHAPTER 13: GOVERNANCE

Most published literature focuses on effective corporate governance for large public companies. However, for DeFi protocols to govern themselves successfully, innovative methods have to be implemented.

To provide some context, imagine managing an online community across the world that consists of members from different time zones, possess various objectives, and are mostly anonymous. This becomes even more complex when large amounts of capital are involved, and communication is largely limited to social media platforms (e.g., Telegram, Discord, etc.)

So how do DeFi projects manage conflicting interests and power struggles? Who gets to decide on the usage of funds and their distribution methods? What initiatives do projects need to prioritize?

Unlike traditional companies with a centralized management structure, DeFi protocols are not required to follow any rules other than those encoded on-chain. This is commonly referred to as “Code is Law”.

DeFi protocols organize themselves as Decentralized Autonomous Organizations (DAOs), organizations governed by smart contracts on the blockchain. DAOs allow groups of people to cooperate without centralized management and coordinate around a shared set of rules to achieve a common mission.

To address DeFi protocol governance, projects such as Compound pioneered the governance token model. **Governance tokens provide voting power, allowing token holders to vote on protocol proposals that any community member can submit.**

Admittedly, this system is not perfect. There are all kinds of problems such as voter apathy, high participation cost due to gas fees, and non-binding voting results (failure to reach quorum). Nevertheless, it is essential to remember that DeFi is still in its infancy. Until a newer and better governance system is developed, this model will remain the industry standard.

Now that you have a better understanding of how DeFi protocols govern themselves, we would like to share two projects that offer governing tools for DeFi projects to use: Aragon and Snapshot.

Aragon



What is Aragon?

Aragon is a community-driven project with the mission to empower freedom by creating tools for decentralized organizations to thrive. As technology advances at an unprecedented speed, there are concerns about its role in creating a global regime of centralized control, surveillance, and oppression. Aragon is determined to create a society that is free, open, and fair.

Aragon was born to disintermediate the creation and maintenance of companies and other organizational structures.

The Aragon project is stewarded by the Aragon Association, a non-profit entity based in Zug, Switzerland, and governed by Aragon Network Token (ANT) holders.

What is the Aragon Court?

Aragon Court is the solution created by Aragon that mimics the function of the legal courts in the traditional business world. When there are conflicts, participants can escalate them to Aragon Court, where jurors will decide whether any parties should be penalized.

Jurors are randomly selected from the juror pool to review and rule on the dispute by locking ANJ tokens. Unlike traditional courts, jurors are compensated with dispute fees when they vote for the majority result. As such, the system is not catered for unbiased decisions but rather leans on social consensus.

Jurors that voted for the minority result will have a part of their ANJ tokens taken away and rewarded to jurors that voted for the majority. If the result is unsatisfactory, any party can pay a fee to appeal the dispute where a larger number of jurors will review it. This process can be repeated until the entire juror pool rules on the dispute.

Jurors also earn monthly subscription fees on top of the dispute fees when they are not drafted.

How to become a juror?

To become a juror, you will need to have at least 10,000 Aragon Court (ANJ) tokens, which can be purchased from DEXs such as Uniswap. ANJ is created by locking Aragon (ANT) tokens in a bonding curve - the more ANT that is locked, the more ANJ that can be created.

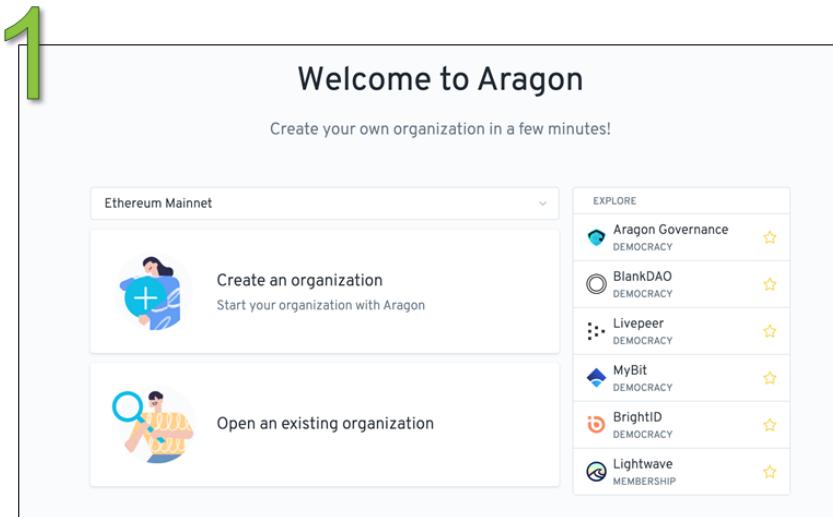
As of April 2021, there is an ongoing merger of ANJ and ANT because the community is skeptical of the need to have two tokens and believes that the complexity outweighs its benefits. The merger is expected to be completed in two parts.

The first part is live as of April 2021, where ANJ holders can redeem their tokens at 0.015 ANT per ANJ. The second part of the ANJ merger will enable ANJ holders to redeem locked-up ANT. The rate will be 0.044 ANT per ANJ, with a 12-month lock.

Who uses Aragon?

Prominent DeFi projects such as Aave and Curve use Aragon. As of September 2020, more than 1,600 DAOs have been created with \$350 million stored in Aragon.⁹

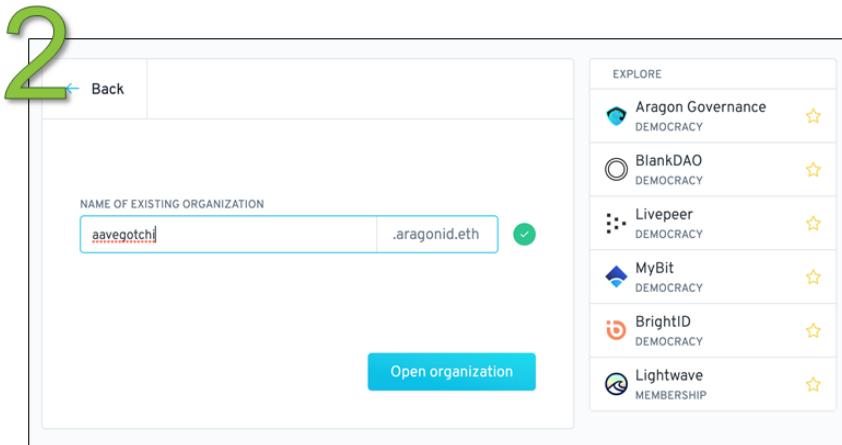
Aragon Step-by-Step Guide



Step 1

- Visit <https://client.aragon.org/#/>, choose “Open an existing organization”.

⁹ Powered by Aragon. Retrieved January 29, 2021 from <https://poweredby.aragon.org/>



Step 2

- In this example, we are going to vote for the Aavegotchi protocol. After typing in the name, we can see the organization is available, as shown with the green tick.
- Click “Open organization”.

3

Step 3

- Click the voting tab on the left hand menu. Open votes will be shown.
- Choose the one that you want to vote for.

4



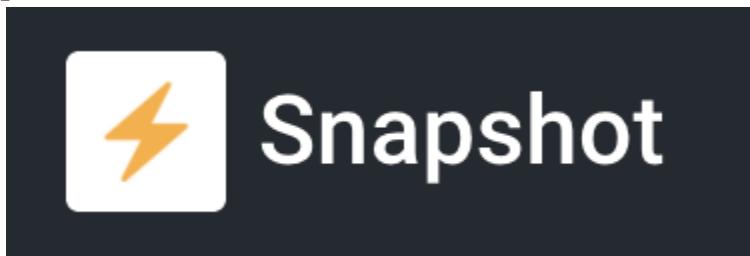
Step 4

- Choose Yes or No and complete the Metamask transaction.
- You have voted!

Recommended Readings

1. Aragon DAOs (Placeholder VC)
<https://www.placeholder.vc/blog/2020/5/7/aragon-daos>
2. 'The World is Crying for the Tech We're Building:' An interview with DAO maker Aragon's Luis Cuende (Decrypt)
<https://decrypt.co/32280/the-world-is-crying-for-the-tech-were-building-an-interview-with-dao-maker-aragons-luis-cuende>
3. DAOs Will Never Govern the World At This Pace (Coindesk)
<https://www.coindesk.com/daos-govern-world-pace>

Snapshot



What is Snapshot?

Due to rising Ethereum gas fees, costs to vote on-chain have become unbearably expensive, hindering small token-holders from participating in the governance process. Snapshot attempts to solve this by taking a snapshot of votes off-chain, effectively making the voting process gas-free.

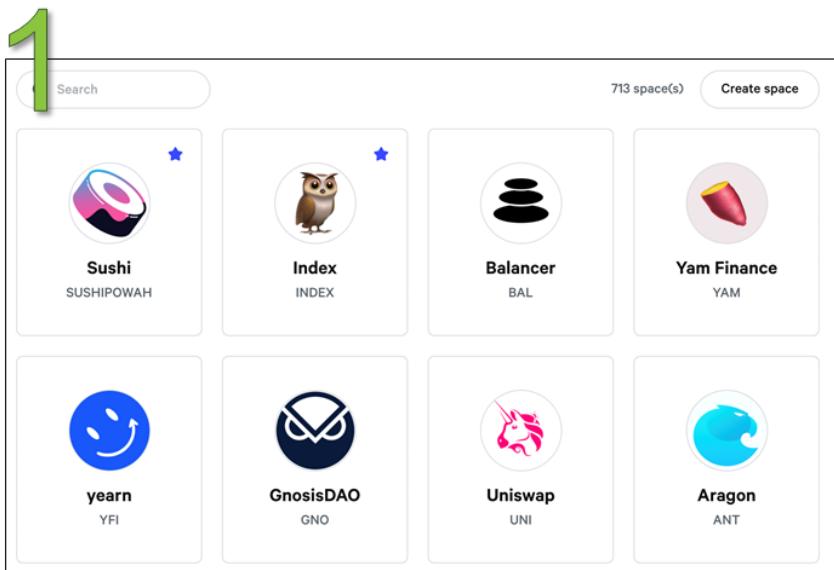
Snapshot has seen many DeFi projects making use of its tool to set up governance processes. As of January 2021, Snapshot is free to use, and as many as 418 different projects have already registered to use Snapshot.

What are the shortcomings of using Snapshot?

Because Snapshot uses off-chain voting, voting results obtained are not binding on-chain by smart contracts. Rather, project teams or multi-sig holders will have to carry out the voting result on-chain, which might not happen if the result is contentious.

Effectively, Snapshot becomes just a poll where the power of execution still lies on other parties. Although this means that power is still somewhat centralized, the solution provided by Snapshot remains a practical and cost-effective solution for DeFi projects to allow community members to participate in the governance process.

Snapshot: Step-by-Step Guide



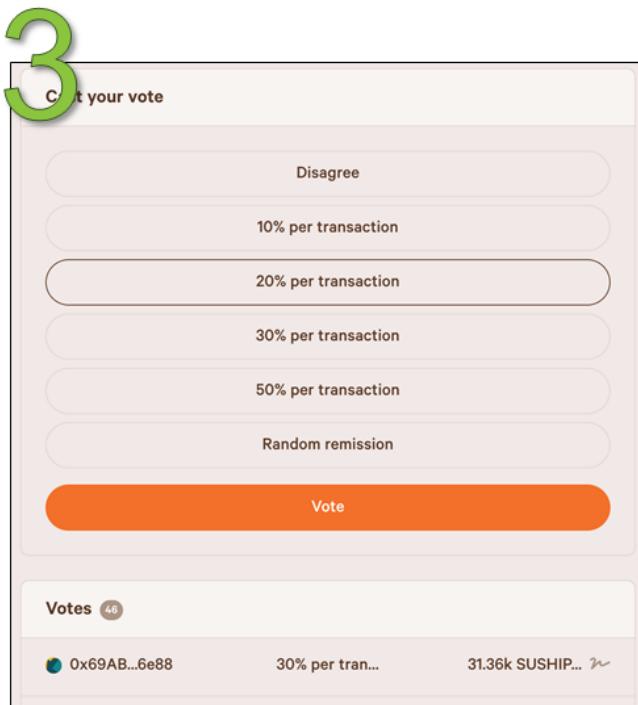
Step 1

- Visit <https://snapshot.page/#/> and pick the project that you want to vote for.
- For this example we will look at Sushiswap (SUSHI).

All	Core	Community	Active	Pending	Closed
			Active	It is suggested to subsidize gas expenses	
#QmcJiUj	By 0x86C5...E68D	end in 7 months			
			Active	Sushi on ZKSwap	
#QmYdzGx	By 0xBCf7...E09d	end in 1 day			
			Closed	Onsen on BSC	
#QmTT7KR	By 0x4952...2B43	1.49 SUSHIPOWAH ended 4 hours ago			
			Closed	fewdsvaxwes	
#QmT4yzm	By 0x4472...1694	ended 2 days ago			

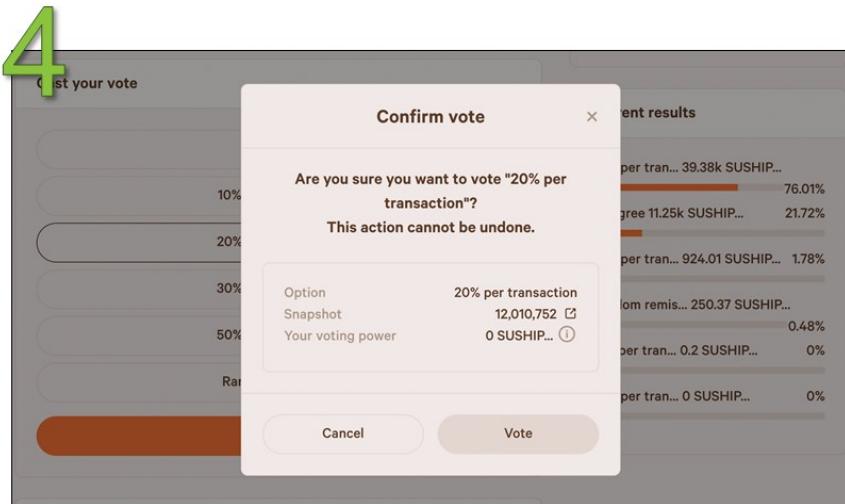
Step 2

- Click the active proposal that you want to vote for. In this example, we are going to choose the first proposal.



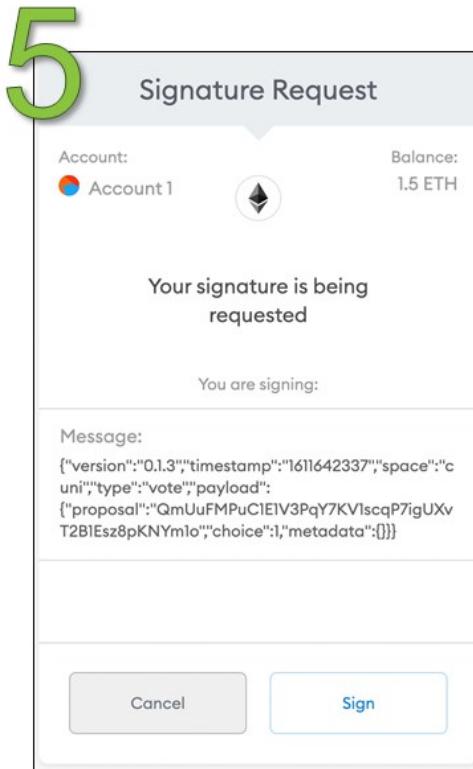
Step 3

- Read the proposal and scroll down until you see the voting options. We can see the voting history of addresses that have voted. In this example, SUSHI token is required for voting.
- Click the option that you want to vote for and click vote.



Step 4

- After verifying the voting power and the correct option, click vote.



Step 5

- Click sign on the signature message. This whole operation will not incur any fees.
- You have voted. You can go back to the proposal page to check your vote history.

Recommended Readings

1. The holy grail: Off-chain polling with on-chain execution (Aragon)
<https://aragon.org/blog/snapshot>
2. Decentralized Governance. How to Put Power Into the Hands of the People (Trust Wallet)
<https://trustwallet.com/blog/decentralized-governance-power-in-hands-of-people>
3. DAO or Die: How to Fully Decentralize the Off-chain Governance of Your Crypto Project (Otonomos)
<https://otonomos.com/2020/05/dao-or-die-how-to-fully-decentralize-the-off-chain-governance-of-your-crypto-project/>

CHAPTER 14: DEFI DASHBOARD

What is a Dashboard?

A dashboard is a simple platform that aggregates all your DeFi activities in one place. It is a useful tool to visualize and track where your assets are across the different DeFi protocols. The dashboard is able to segregate your assets into different categories such as deposit, debt and investments.

Typically when you access your dashboard, you will need to enter your Ethereum address (e.g.: `0x4Cd86fa95Ec2704f0849825f1F8b077deeD8d39`). Alternatively, you could enter your Ethereum Name Service (ENS) domain. ENS domain is a human-readable Ethereum address that you can purchase for a period of time. It is similar to Internet domain names such as <http://www.coingecko.com/> which then maps to the IP address of the server where CoinGecko is hosted.

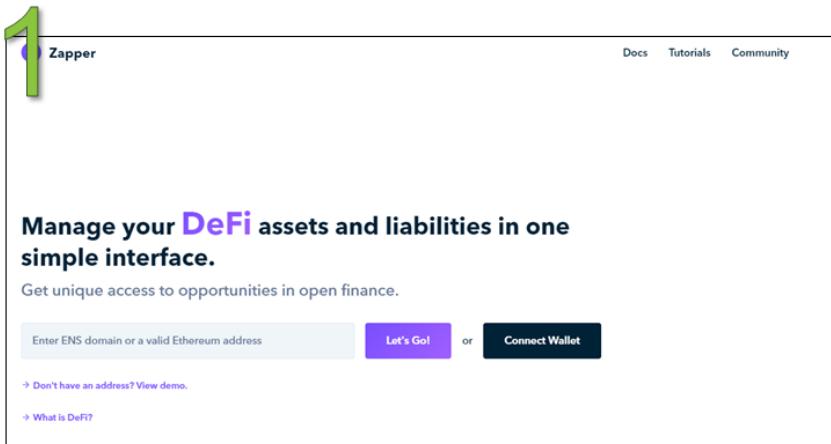
Check out our [ENS guide here](#) if you are interested in creating your own ENS domain!

Note: ENS domain is completely optional.

There are several dashboards in the market with the capacity to track your assets, but the two leading players for dashboards are Zapper (previously known as DeFiSnap) and Zerion.

For simplicity, we will be focusing on a step-by-step guide on how to use Zapper.

Zapper: Step-by-Step Guide



Step 1

- Go to <https://zapper.fi/>
- Enter your ENS domain or your Ethereum Address
- Here we used defiportal.eth but we can also key in 0x358a6c0f7614c44b344381b0699e2397b1483252

DeFi Dashboard

The screenshot shows the Zapper DeFi Dashboard. At the top, there is a green '2' icon, the Zapper logo, and the network selection 'delportal.eth - Ethereum'. The top navigation bar includes 'Dashboard', 'Exchange', 'Pool', 'Farm', 'History', and a settings icon. The top right corner shows 'USD', '86', and a gear icon.

Account Overview (Don't see your assets?)

	Total Assets	Total Debt	Net Worth
	\$2,689.40	\$2.44	\$2,686.96

Switch View (button)

Platforms

Synthetix	\$9.82
Compound	\$7.43
Aave	\$10.86
dYdX	\$204.63
PoolTogether	\$1.00

Asset Allocation

Wallet	50.78%
Deposits	46.67%
Investments	2.54%
Yield Farming	0.01%

Platform Allocation

dYdX	87.46%
Aave	4.64%
Synthetix	4.20%
Compound	3.18%
PoolTogether	0.43%

Step 2

- You are on the dashboard!
- You can see your wallet balance, and any DeFi deposits, investments, yield farming, and debt.
- Scroll down further, and you will see which protocols your assets are currently locked inside.

How to DeFi: Beginner

The screenshots illustrate the Zapper interface, a DeFi dashboard. The first screenshot shows the main dashboard with a 'Waller not connected' message and a 'Connect Wallet' button. The second screenshot shows the 'Pool' tab, where users can add liquidity to various pools. The third screenshot shows the 'Farm' tab, where users can stake their liquidity to earn rewards. The interface is clean and user-friendly, providing a one-stop shop for DeFi users.

Step 3

- Apart from seeing your asset allocation on-chain, Zapper serves as an all-in-one dashboard for you to make your investment decisions, such as swapping tokens, providing liquidity, and participating in yield farms.

Alternatively, you can check out other dashboards:

- <https://zerion.io/>
- <https://mydefi.org/apps> (acquired by Zerion but still operating)
- <https://frontierwallet.com/> (Dashboard for mobile phones)
- <https://debank.com/>
- <https://unspent.io/>

PART FOUR: DEFI IN ACTION

CHAPTER 15: DEFI IN ACTION

In the previous sections, we talked about the importance of DeFi and showed some of the products available in the DeFi ecosystem. However, questions remain on just how decentralized DeFi Dapps are and if anyone is actually using DeFi in real life. In this section, we will explore DeFi in action with two case studies showing the robustness and usefulness of DeFi.

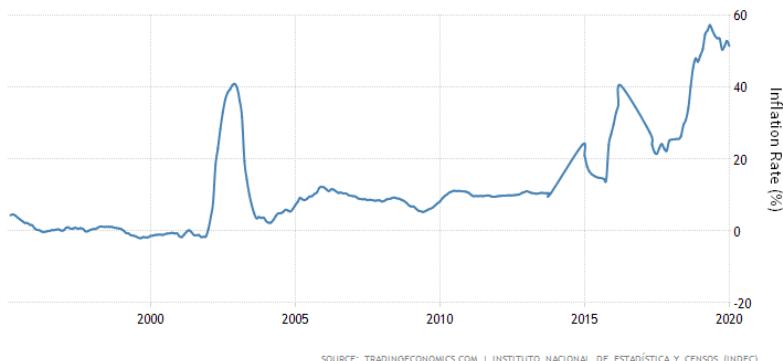
Surviving Argentina's High Inflation

During the Devcon 5 Ethereum conference in October 2019, Mariano Conti, Head of Smart Contracts at Maker Foundation gave a [talk](#) on how he survives Argentina's inflation. The inflation rate for Argentina reached 53.8% in 2019, the highest rate in 28 years. This placed Argentina as the top 5 countries in the world with the highest inflation rates.¹⁰

To live in a country where the value of your national currency practically halves every year is tough. To survive in Argentina, Mariano requested for his salary to be fully paid in DAI. As you may recall from our previous section, DAI is a stablecoin pegged to the USD. According to Mariano, Argentinians value the USD a lot. Despite the USD having inflationary problems as well, compared to the Argentine Peso, it is nothing.

¹⁰ "Argentina inflation expected at 53% in December ... – Reuters." 11 Sep. 2019, <https://www.reuters.com/article/argentina-economy/argentina-inflation-expected-at-53-in-december-2019-treasury-officials-idINKCN1VX09U>.

Argentina Inflation Rate (1995 - 2020)



SOURCE: TRADINGECONOMICS.COM | INSTITUTO NACIONAL DE ESTADÍSTICA Y CENSO (INDEC)

Source: [TradingEconomics.com](https://tradingeconomics.com/argentina/inflation-rate)

If the USD is attractive to most Argentinians, it is natural then that most Argentinians would prefer to keep their money in USD. However, the government in Argentina places capital control on this, making it hard to get access to the USD. There is a limit on the purchase of USD, and Argentinians can only purchase a maximum of \$200 per month. As a result of this, the black market demand for the USD has risen, causing the exchange rate to be approximately 30% higher than the officially declared rate by the government.¹¹

Besides placing a limit on purchases, the Central Bank of Argentina also exposed 800 citizens' names, ID number and tax identification because they exceeded the previous purchase limit of \$10,000.¹² Furthermore, Argentinians who work for foreign companies and are invoiced in USD must liquidate their USD to Argentine Peso within 5 days.

According to Mariano, several years ago, many Argentinian freelancers preferred getting paid in Bitcoin. While this worked well in the earlier years

¹¹ “Argentina’s ‘little trees’ blossom as forex controls fuel black ...” 5 Feb. 2020, <https://www.reuters.com/article/us-argentina-currency-blackmarket/argentinias-little-trees-blossom-as-forex-controls-fuel-black-market-idUSKBN1ZZ1H1>.

¹² “Argentina Central Bank Exposed 800 Citizens ... – BeInCrypto.” 29 Sep. 2019, <https://beincrypto.com/argentina-central-bank-exposed-sensitive-information-of-800-citizens/>.

before 2018 when Bitcoin price was on an uptrend, as the market turned downwards, there was an urgent need to convert Bitcoin immediately to Argentine Peso otherwise their salary will be greatly reduced. While Bitcoin provided many Argentinians with an alternative way of being paid, the volatile nature of Bitcoin meant that there was a need for “better money”.

For Mariano, DAI is the solution to this problem as it has all the advantages of cryptocurrencies while staying pegged to the USD. But what does he do with his DAI? Once a month, he withdraws the bare minimum to pay for items like rent, groceries, and credit card bills, keeping his Argentine Peso balance as close to 0 as possible.

He also uses his DAI for crypto transactions, such as purchasing ETH and putting DAI into Dai Savings Rate. From this, he can earn interest on a stablecoin that he would otherwise not have access to. While he acknowledges that by using DeFi Dapps, he exposes himself to smart contract risks, he feels that the risk of holding Argentinian Peso is high too.

To Mariano, being paid in DAI allows him to “escape” issues such as volatility, inflation, and control facing his country. This issue is not just facing Argentina but several other economies globally, and this is proof of how DeFi can be valuable for people living in these countries.

Click the link below to watch Mariano’s entire presentation:

<https://slideslive.com/38920018/living-on-defi-how-i-survive-argentinas-50-inflation>.

Uniswap Ban

This content is not available in your country due to a legal complaint from the government. [Learn more](#).

Sorry about that.



Looks familiar? (Image Credit: gtricks.com¹³)

Most of us have likely seen this—a video or mobile app that is not available because of our location or due to censorship. It's infuriating and annoying, but life goes on. You can find the video elsewhere or simply download another similar application for the same service.

Bans on videos or apps may not have overly adverse effects, but the same cannot be said if you are banned from having access to banks or financial institutions instead. Unfortunately, this hits hardest on those who need it most, as they likely do not keep large amounts of extra cash on hand. A person may be forced to take loans to cover their expenses, potentially snowballing to many other things down the road.

That being said, within the DeFi ecosystem, censorships have happened as well. One notable occasion was the Uniswap (decentralized exchange) geographical ban back in December 2019. At that time, the Uniswap team quietly updated and published a change to their open-sourced codebase on Github to exclude certain countries (Belarus, Cuba, Iran, Iraq, Côte d'Ivoire,

¹³ “Watch YouTube Blocked Videos Not Available in Your Country.” <https://www.gtricks.com/youtube/watch-blocked-youtube-videos-not-available-in-your-country/>. Accessed 27 Feb. 2020.

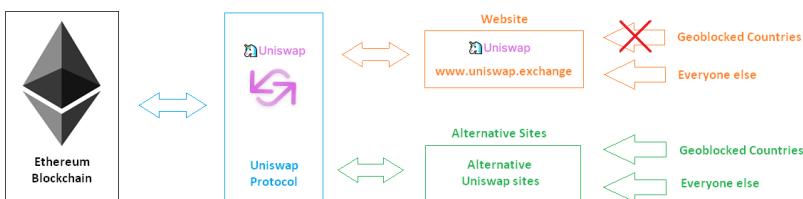
Liberia, North Korea, Sudan, Syria, Zimbabwe) from accessing the main website at www.uniswap.exchange.¹⁴ The result looks like this:



With the geoblock in place, people from the blocked countries can no longer access the Uniswap.exchange website.

Word on the street is that the Uniswap team did so to remain compliant with US laws as the team is based in New York. Regardless of the reason, if Uniswap were to make their services inaccessible to people because of their location, it would go against everything DeFi stands for - allowing **anyone** to have access from **anywhere**.

In upholding the true spirits of DeFi, the geographical ban that the Uniswap team imposed did not stop users from using the Uniswap protocol - in fact, they couldn't. The Uniswap protocol is built and deployed on the Ethereum blockchain, which is accessible worldwide by anyone. Within a matter of hours, multiple sites that are connected to the Uniswap protocol have gone live, enabling banned users to continue accessing the Uniswap protocol.



Since Uniswap protocol is permissionless, anyone can connect to it if they know how to, or have an interface (like uniswap.exchange website) that allows them to.

The key point to note in this incident is that, while the Uniswap team had control of the front-end (www.uniswap.exchange), they had no control over

¹⁴ “Uniswap/uniswap-frontend: An open-source ... - GitHub.”

<https://github.com/Uniswap/uniswap-frontend>. Accessed 27 Feb. 2020.

who can or cannot access the back-end (Uniswap protocol) deployed onto the Ethereum blockchain.

This was an interesting case study as it highlighted the strengths of DeFi protocols, something that would not happen in traditional finance. **A move that was initially made to go against the very core ethos of DeFi ended up showcasing one of its key strengths.**

This is not the first and will not be the last time DeFi applications are challenged. It will be exciting to see what the future holds!

CHAPTER 16: DEFI IS THE FUTURE, AND THE FUTURE IS NOW

The previous chapter highlighted two examples of DeFi in action when DeFi was still at its nascent stage. As DeFi continues to grow, we are already seeing a massive influx of institutional and retail investors. Many pundits from traditional finance have already started to recognize bitcoin's value, which is often equated to digital gold. However, if you have read this book, you would understand that bitcoin is merely scratching the surface of what DeFi truly offers.

We are already starting to see Traditional Finance (TradFi) players tap into the DeFi market. For example, [Siam Commercial Bank](#) has invested in Alpha Finance Lab and is working closely together to create a unique suite of products that bridges the gap between the traditional and decentralized financial sectors. Other examples include [Yield.app](#) that doubles up as a yield aggregator (similar to hedge funds) and employs both portfolio managers and smart contract technology for users to earn passive income in DeFi. As bridges between TradFi and DeFi start to develop, DeFi is increasingly recognized as an alternative financial ecosystem.

The overarching theme is that TradFi cannot ignore the lucrative opportunities that DeFi offers because DeFi represents the future of finance. While this can sound controversial, we will summarize here why we think this is the case.

At the start of 2020, the Total Value Locked in DeFi Dapps hit the significant milestone of \$1 billion. In other words, that is the total amount of programmable money currently stored in smart contracts that serve as the building blocks of an entirely new decentralized financial system on the internet.

While \$1 billion locked into DeFi may seem like a small number compared to traditional financial markets, the growth has been staggering. Here's a quick summary of the journey:

- 2018: Total Value Locked increased 5 times from \$50 million to \$275 million
- 2019: Total Value Locked increased 2.4 times to \$667 million
- 2020: Total Value Locked increased 23.5 times to \$15.7 billion
- 2021: Total Value Locked reached \$86.05 billion (April 2021)¹⁵

Before we push on, let's have a quick recap on some of the things DeFi allows us to achieve:

Transparency: A transparent, auditable financial ecosystem.

Accessibility: Free access to DeFi applications without fear of discrimination on race, gender, beliefs, nationality, or geographical status.

Efficiency: Programmable money makes it possible to remove the centralized middlemen to create a more affordable and efficient financial market.

Convenience: Money can now be sent anywhere, anytime, and to anyone with a cryptocurrency wallet. All this for a small fee and with little waiting time.

All of the above have made it possible for users to do provide liquidity to earn yields on unproductive assets with no maturation/lock-in period, take loans (with collateral) without paperwork and repay them anytime, and execute automated trading strategies easily.

¹⁵ <https://defillama.com/home>

DeFi allows users to access financial services anywhere and anytime, as long as one is connected to the Internet. Now that's the power of DeFi accessibility, and we are only just getting started on this journey.

What about DeFi User Experience?

We are glad you asked—while accessibility to DeFi apps may be a non-issue, one of the major pain points for DeFi remains the overall user experience.

That said, many teams worldwide are hard at work trying to improve the experience. Have a look at some of them and the aspects they are attempting to solve:

Wallet - [Argent](#) is creating a radically better user-focused crypto wallet experience, with state-of-the-art security, native integration with DeFi Dapps such as Compound and others, as well as not needing seed keys.

Participation of products - [Zapper](#) abstracts away many of the complexities and steps involved with DeFi products. It also allows users to access multiple financial products in one transaction, saving time and effort.

User-friendly development - [Gelato Finance](#) recently launched their “If this, then that” for crypto. It allows users to set actions that will be done once certain conditions are met, such as “Buy ETH when it is \$200” or “Send some money to Alice when it’s her birthday.”

Insurance - Financial market effectively facilitates the transfer of risk - one man’s hedge against his position is another man’s profit. Insurance is now available via DeFi insurers such as [Nexus Mutual](#). If you are willing to accept a lower yield on the money you have placed on lending protocols such as Compound in exchange for peace of mind, it can now be done.

Aggregation of liquidity - There are many different decentralized exchanges (DEXs) in the market with varying liquidity. It is a headache for users to choose which one is the best for their trade. This is slowly becoming a thing of the past with liquidity aggregators such as [1inch.exchange](#),

[Paraswap](#), and [Matcha](#) helping users to automatically split orders across DEXs to ensure the best possible execution prices.

Yield optimization - Remember switching around different banks for the best rates for fixed deposits? You don't have to do that in DeFi - yield aggregators such as [Yearn.finance](#), [idle.finance](#), and [DeFiSaver](#) automatically allocate your cryptoassets to places with the best yield opportunities.

While there is no single “killer app” that bridges the user experience gap at the moment, we think it's not going to be far away!

CLOSING REMARKS

Phew, that was a blast to write! If you are reading this line here, congratulations, you are now up to date on DeFi, and you should pat yourself on the back!

Thank you for your time, and we hope you have enjoyed reading this book as much as we have enjoyed researching, learning, and writing it! :)

Welcome to DeFi and the future of finance!

APPENDIX

CoinGecko's Recommended DeFi Resources

Information

DefiLlama - <https://defillama.com/home>

DeBank - <https://debank.com/>

DeFi Prime - <https://defiprime.com/>

DeFi Pulse - <https://defipulse.com/>

LoanScan - <http://loanscan.io/>

News Sites

CoinDesk - <https://www.coindesk.com/>

CoinTelegraph - <https://cointelegraph.com/>

Decrypt - <https://decrypt.co/>

The Block - <https://www.theblockcrypto.com/>

Crypto Briefing - <https://cryptobriefing.com/>

Newsletters

Bankless - <https://bankless.substack.com/>

DeFi Tutorials - <https://defitutorials.substack.com/>

DeFi Weekly - <https://defiweekly.substack.com/>

Dose of DeFi - <https://doseofdefi.substack.com/>

Ethhub - <https://ethhub.substack.com/>

My Two Gwei - <https://mytwogwei.substack.com/>

The Defiant - <https://thedefiant.substack.com/>

Week in Ethereum News - <https://www.weekinethereumnews.com/>

Podcast

CoinGecko - <https://podcast.coingecko.com/>

BlockCrunch - <https://castbox.fm/channel/Blockcrunch%3A-Crypto-Deep-Dives-id1182347>

Chain Reaction - <https://fiftyonepercent.podbean.com/>

Into the Ether - Ethhub - <https://podcast.ethhub.io/>

PoV Crypto - <https://povcryptopod.libsyn.com/>

Wyre Podcast - <https://blog.sendwyre.com/wyretalks/home>

Youtube

Yield TV by Zapper -

<https://www.youtube.com/channel/UCYq3ZxBx7P2ckJyWVDC597g>

Bankless -

<https://www.youtube.com/channel/UCAI9Ld79qaZxp9JzEOwd3aA>

Chris Blec - <https://www.youtube.com/c/chrisblec>

Bankless Level-Up Guide

<https://bankless.substack.com/p/bankless-level-up-guide>

Projects We Like Too

Dashboard Interfaces

Zapper - <https://zapper.fi/dashboard>

Frontier - <https://frontierwallet.com/>

InstaDapp - <https://instadapp.io/>

Zerion - <https://zerion.io/>

Debank - <https://debank.com/>

Decentralized Exchanges

SushiSwap - <https://sushi.com/>

Balancer - <https://balancer.exchange/>

Bancor - <https://www.bancor.network/>

Curve Finance - <https://www.curve.fi/>

Kyber Network - <https://kyberswap.com/swap>

Appendix

Exchange Aggregators

1inch - <https://1inch.exchange/>

Dex.ag - <https://dex.ag/>

Paraswap - <https://paraswap.io/>

Matcha - <https://matcha.xyz/>

Lending and Borrowing

Compound - <https://compound.finance/>

Aave - <https://aave.com/>

Cream - <https://cream.finance/>

Prediction Markets

Augur - <https://www.augur.net/>

Taxes

TokenTax - <https://tokentax.co/>

Wallet

GnosisSafe - <https://safe.gnosis.io/>

Monolith - <https://monolith.xyz/>

Yield Optimisers

Yearn - <https://yearn.finance/>

Alpha Finance - <https://alphafinance.io/>

References

Chapter 1: Traditional Financial Institutions

Bagnall, E. (2019, June 30). Top 1000 World Banks 2019 – The Banker International Press Release – for immediate release. Retrieved February 20, 2020, from <https://www.thebanker.com/Top-1000-World-Banks/Top-1000-World-Banks-2019-The-Banker-International-Press-Release-for-immediate-release>

Boehlke, J. (2019, September 18). How Long Does It Take to Have a Payment Post Online to Your Bank? Retrieved February 20, 2020, from <https://www.gobankingrates.com/banking/checking-account/how-long-payment-posted-online-account/>

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., Hess, J. (2018). The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. https://doi.org/10.1596/978-1-4648-1259-0_ch2

How long does an Ethereum transaction really take? (2019, September 25). Retrieved February 20, 2020, from <https://ethgasstation.info/blog/ethereum-transaction-how-long/>

International Wire Transfers. (n.d.). Retrieved February 20, 2020, from <https://www.bankofamerica.com/foreign-exchange/wire-transfer.go>

Karlan, D., Ratan, A. L., & Zinman, J. (2014, March). Savings by and for the poor: a research review and agenda. Retrieved February 20, 2020, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4358152/>

Stably. (2019, September 20). Decentralized Finance vs. Traditional Finance: What You Need To Know. Retrieved from <https://medium.com/stably-blog/decentralized-finance-vs-traditional-finance-what-you-need-to-know-3b57aed7a0c2>

Chapter 2: What is Decentralized Finance (DeFi)?

Campbell, L. (2020, January 6). DeFi Market Report for 2019 - Summary of DeFi Growth in 2019. Retrieved from <https://defirate.com/market-report-2019/>

Mitra, R. (n.d.). DeFi Use cases: The Best Examples of Decentralised Finance. Retrieved from https://blockgeeks.com/guides/defi-use-cases-the-best-examples-of-decentralised-finance/#_Tool_2_DeFi_Derivatives

Shawdagor, J. (2020, February 23). Sectors Realizing the Full Potential of DeFi Protocols In 2020. Retrieved from <https://cointelegraph.com/news/sectors-realizing-the-full-potential-of-defi-protocols-in-2020>

Thompson, P. (2020, January 5). Most Significant Hacks of 2019 - New Record of Twelve in One Year. Retrieved February 20, 2020, from <https://cointelegraph.com/news/most-significant-hacks-of-2019-new-record-of-twelve-in-one-year>

Chapter 3: The Decentralized Layer: Ethereum

What is Ethereum? (2020, February 11). Retrieved from <https://ethereum.org/what-is-ethereum/>

Rosic, A. (2018). What is Ethereum Gas? [The Most Comprehensive Step-By-Step Guide]. Retrieved from <https://blockgeeks.com/guides/ethereum-gas/>

Rosic, A. (2017). What Are Smart Contracts? [Ultimate Beginner's Guide to Smart Contracts]. Retrieved from <https://blockgeeks.com/guides/smart-contracts/>

Chapter 4: Ethereum Wallets

Lee, I. (2018, June 22). A Complete Beginner's Guide to Using MetaMask. Retrieved from <https://www.coingecko.com/buzz/complete-beginners-guide-to-metamask>

Lesuisse, I. (2018, December 22). A new era for crypto security. Retrieved from <https://medium.com/argenthq/a-new-era-for-crypto-security-57909a095ae3>

Wright, M. (2020, February 13). Argent: The quick start guide. Retrieved from <https://medium.com/argenthq/argent-the-quick-start-guide-13541ce2b1fb>

Chapter 5: Decentralized Stablecoins

The Maker Protocol: MakerDAO's Multi-Collateral Dai (MCD) System (n.d.). Retrieved February 20, 2020, from <https://makerdao.com/whitepaper/>

MKR Tools (n.d.). Retrieved February 20, 2020, from <https://mkr.tools/governance/stabilityfee>

Maker Governance Dashboard (n.d.). Retrieved February 20, 2020, from <https://vote.makerdao.com/pollin>

Currency Re-imagined for the World: Multi-Collateral Dai Is Live! (2019, November 18). Retrieved from <https://blog.makerdao.com/multi-collateral-dai-is-live/>

Dai is now live! (2017, December 19). Retrieved from <https://blog.makerdao.com/dai-is-now-live/>

DSR. (n.d.). Retrieved February 20, 2020, from <https://community-development.makerdao.com/makerdao-mcd-faqs/faqs/dsr>

John, J. (2019, December 4). Stable Coins In 2019. Retrieved from <https://www.decentralised.co/what-is-going-on-with-stable-coins/>

Tether: Fiat currencies on the Bitcoin blockchain. (n.d.). Tether Whitepaper. Retrieved from <https://tether.to/wp-content/uploads/2016/06/TetherWhitePaper.pdf>

Chapter 6: Decentralized Borrowing and Lending

Kulechov, S. (2020). The Aave Protocol V2. Retrieved 28 January 2021, from <https://medium.com/aave/the-aave-protocol-v2-f06f299cee04>

Leshner, R. (2018, December 6). Compound FAQ. Retrieved from <https://medium.com/compound-finance/faq-1a2636713b69>

(2021). Retrieved 28 January 2021, from <https://docs.aave.com/portal/>
(2021). Retrieved 28 January 2021, from <https://github.com/aave/governance-v2>

Chapter 7: Decentralized Exchange (DEX)

Connect to Uniswap. (n.d.). Retrieved from <https://docs.uniswap.io/frontend-integration/connect-to-uniswap#factory-contract>

Introducing 1inch v2. Retrieved 28 January 2021, from <https://1inch-exchange.medium.com/introducing-1inch-v2-defis-fastest-and-most-advanced-aggregation-protocol-c42573dc3f85>

Peaster, W. (2020). Initial DeFi Offering. Retrieved from <https://defiprime.com/initial-defi-offering>

Uniswap: Stats, Charts and Guide: DeFi Pulse. (n.d.). Retrieved from <https://defipulse.com/uniswap>

Uniswap Whitepaper. (n.d.). Retrieved from <https://hackmd.io/@Uniswap/HJ9jLsfTz>

Zhang, Y., Chen, X., & Park, D. (2018). Formal Specification of Constant Product ($x \times y = k$) Market Maker Model and Implementation. Retrieved from <https://github.com/runtimeverification/verified-smart-contracts/blob/uniswap/uniswap/x-y-k.pdf>

Chapter 8: Decentralized Derivatives

Tulip Mania (n.d.). Retrieved from

https://penelope.uchicago.edu/~grout/encyclopaedia_romana/aconite/tulipomania.html

Chen, J. (2020, January 27). Derivative. Retrieved from

<https://www.investopedia.com/terms/d/derivative.asp>

Decentralised synthetic assets. (n.d.). Retrieved from

<https://www.synthetix.io/products/exchange/>

Synthetix.Exchange Overview. (2019, February 15). Retrieved from

<https://blog.synthetix.io/synthetix-exchange-overview/>

Synthethix Litepaper v1.3. (2019). Retrieved from

https://www.synthetix.io/uploads/synthetix_litepaper.pdf

Chapter 9: Decentralized Fund Management

Making Sense of the Mutual Fund Scandal Everything you may not want to ask (but really should know) about the crisis that's rocking the investment world. (2003, November 24). Retrieved from

https://money.cnn.com/magazines/fortune/fortune_archive/2003/11/24/353794/index.htm

The Editors of Encyclopaedia Britannica. (2020, February 26). Bernie Madoff. Retrieved from <https://www.britannica.com/biography/Bernie-Madoff>

Frequently Asked Questions on TokenSets. (n.d.). Retrieved from

<https://www.tokensets.com/faq>

Liang, R. (2019, April 23). TokenSets is Live: Automate your Crypto Portfolio Now. Retrieved from <https://medium.com/set-protocol/tokensets-is-live-automate-your-crypto-portfolio-now-50f88dcc928d>

Appendix

Sawinyh, N. (2019, June 17). Interview with TokenSets creators. Retrieved from <https://defiprime.com/tokensets>

Sassano, A. (2019, June 19). How Set Protocol Works Under the Hood. Retrieved from <https://medium.com/@AnthonySassano/how-set-protocol-works-under-the-hood-74fcdae858e2>

Sassano, A. (2020, January 22). Set Social Trading is Now Live on TokenSets. Retrieved from <https://medium.com/set-protocol/set-social-trading-is-now-live-on-tokensets-c981b5e67c5f>

Sassano, A. (2020). What To Expect With Set V2. Retrieved 28 January 2021, from <https://medium.com/set-protocol/what-to-expect-with-set-v2-15459581c6d4>

Chapter 10: Decentralized Lottery

Cusack, L. (2020, February 3). PoolTogether raises \$1 Million to Expand Prize Linked Savings Protocol. Retrieved from <https://medium.com/pooltogether/pooltogether-raises-1-million-to-expand-prize-linked-savings-protocol-eb51a1f88ed8>

Guillén, M.F., Tschoegl, A.E. Banking on Gambling: Banks and Lottery-Linked Deposit Accounts. *Journal of Financial Services Research* 21, 219–231 (2002). <https://doi.org/10.1023/A:1015081427038>

H.148. (2019). Retrieved from <https://legislature.vermont.gov/bill/status/2020/H.148>

Lemke, T. (2019, February 21). What Are Prize-Linked Savings Accounts? Retrieved from <https://www.thebalance.com/what-are-prize-linked-savings-accounts-4587608>

LLC, P. T. (n.d.). PoolTogether. Retrieved from <https://www.pooltogether.com/#stats>

Markets. (n.d.). Retrieved from <https://compound.finance/markets>

PoolTogether. (2020, February 8). Wow! The winner of the largest prize ever only 10 Dai deposited! They won \$1,648 Dai A 1 in 69,738 chance of winning. Congrats to the little fish! [pic.twitter.com/0DSFkSdbIE](https://twitter.com/0DSFkSdbIE). Retrieved from

[https://twitter.com/PoolTogether /status/1225875154019979265](https://twitter.com/PoolTogether/status/1225875154019979265)

Texas Proposition 7, Financial Institutions to Offer Prizes to Promote Savings Amendment (2017). (2017). Retrieved from [Texas Proposition 7, Financial Institutions to Offer Prizes to Promote Savings Amendment \(2017\)](https://www.tsls.state.tx.us/Prop7/Prop7.html)

Chapter 11: Decentralized Payment

Bramanathan, R. (2020, February 1). What I learned from tokenizing myself. Retrieved from <https://medium.com/@bramanathan/what-i-learned-from-tokenizing-myself-bb222da07906>

Chapter 12: Decentralized Insurance

Blockchain, F. (2019, December 4). The Potential for Bonding Curves and Nexus Mutual. Retrieved from
<https://tokentuesdays.substack.com/p/the-potential-for-bonding-curves>

Blockchain, F. (2019, October 2). Nexus Mutual. Retrieved from
<https://tokentuesdays.substack.com/p/nexus-mutual>

Codefi Data. (n.d.). Retrieved from <https://defiscore.io/>

defidad.eth, D. F. D.-. (2020, February 11). @NexusMutual is a decentralized alternative to insurance, providing the #Ethereum community protection against hacks. Here's why it should be on your radar: + Anyone can buy smart contract insurance + Being a backer (staker) can earn up to 50% ROI + It's powered by #Ethereum. Retrieved from

https://twitter.com/DeFi_Dad/status/1227165545608335360?s=09

Docs. (n.d.). Retrieved from

<https://nexusmutual.gitbook.io/docs/docs#pricing>

Appendix

Karp, H. (2019, May 22). Nexus Mutual Audit Report. Retrieved from <https://medium.com/nexus-mutual/nexus-mutual-audit-report-57f1438d653b>

Karp, H. (2019, June 5). Nexus Mutual NXM Token Explainer. Retrieved from <https://medium.com/nexus-mutual/nexus-mutual-nxm-token-explainer-b468bc537543>

Russo, C. (2020, February 19). Arbs made ~\$900K in seconds by exploiting DeFi. It's mind-blowing stuff. Here's The Defiant post w/ exploits' twisted steps (in pics), qs raised about decentralization and price oracles, and consequences so far. What's your take on the blame game? Retrieved from <https://twitter.com/CamiRusso/status/1229849049471373312>

Token Model. (n.d.). Nexus Mutual: A decentralised alternative to insurance. Retrieved from <https://nexusmutual.io/token-model>

Welcome to the Nexus Mutual Gitbook. (n.d.). Retrieved from <https://nexusmutual.gitbook.io/docs/>

Coingecko. (2019). CoinGecko Quarterly Report for Q3 2019. Retrieved from <https://assets.coingecko.com/reports/2019-Q3-Report/CoinGecko-2019-Q3-Report.pdf>

Defiprime. (2020, February 13). what's the key difference vs. @NexusMutual ? Retrieved from <https://twitter.com/defiprime/status/1227720835898560513>

Karp, H. (2019, November 15). Comparing Insurance Like Solutions in DeFi. Retrieved from https://medium.com/@hugh_karp/comparing-insurance-like-solutions-in-defi-a804a6be6d48

OpenZeppelin Security. (2020, February 10). Opyn Contracts Audit. Retrieved from <https://blog.openzeppelin.com/opyn-contracts-audit/>

Chapter 13: Governance

(2020, March 6). Aragon (ANT) Economics. Retrieved from
<https://www.placeholder.vc/blog/2020/3/6/aragon-ant-economics>

(2020, October 20). Proposal: 3 Ideas to Improve Court Security. Retrieved from <https://forum.aragon.org/t/proposal-3-ideas-to-improve-court-security/2377>

(n.d.). Welcome to Snapshot! Retrieved from <https://docs.snapshot.page/>

Chapter 14: DeFi Dashboard

Dashboard for DeFi. (n.d.). Retrieved from
<https://www.defisnap.io/#/dashboard>

Chapter 15: DeFi in Action

(n.d.). Retrieved October 19, 2019, from
<https://slideslive.com/38920018/living-on-defi-how-i-survive-argentinas-50-inflation>

Gundiuc, C. (2019, September 29). Argentina Central Bank Exposed 800 Citizens' Sensitive Information. Retrieved from
<https://beincrypto.com/argentina-central-bank-exposed-sensitive-information-of-800-citizens/>

Lopez, J. M. S. (2020, February 5). Argentina's 'little trees' blossom as forex controls fuel black market. Retrieved from
<https://www.reuters.com/article/us-argentina-currency-blackmarket/argentinas-little-trees-blossom-as-forex-controls-fuel-black-market-idUSKBN1ZZ1H1>

Russo, C. (2019, December 9). Uniswap Website Geo-Ban Can't Stop DeFi. Retrieved from <https://thedefiant.substack.com/p/uniswap-website-geo-ban-cant-stop-370>

GLOSSARY

Index	Term	Description	
#			
A	Annual Percentage Yield (APY)	It is an annualized return on saving or investment and the interest is compounded based on the period.	
	Admin Key	Risk	It refers to the risk where the master private key for the protocol could be compromised.
	Automated Market Maker (AMM)	Automated Market Maker removes the need for a human to manually quote bid and ask prices in an order book and replaces it with an algorithm.	
	Audit	Auditing is a systematic process of examining an organization's records to ensure fair and accurate information the organization claims to represent. Smart contract audit refers to the practice of reviewing the smart contract code to find vulnerabilities so that they can be fixed before it is exploited by hackers.	
	An Application Programming Interface (API)	An interface that acts as a bridge that allows two applications to interact with each other. For example, you can use CoinGecko's API to fetch the current market price of cryptocurrencies on your website.	

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B	Buy and Hold	This refers to a TokenSets trading strategy which realigns to its target allocation to prevent overexposure to one coin and spreads risk over multiple tokens.
	Bonding Curve	A bonding curve is a mathematical curve that defines a dynamic relationship between price and token supply. Bonding curves act as an automated market maker where as the number of supply of a token decreases, the price of the token increases. It is useful as it helps buyers and sellers to access an instant market without the need of intermediaries.
C	Cryptocurrency Exchange	It is a digital exchange that helps users exchange cryptocurrencies. For some exchanges, they also facilitate users to trade fiat currencies to cryptocurrencies.
	Custodian	Custodian refers to the third party to have control over your assets.
	Fiat-collateralized stablecoin	A stablecoin that is backed by fiat-currency. For example, 1 Tether is pegged to \$1.
	Crypto-collateralized stablecoin.	A stablecoin that is backed by another cryptocurrency. For example, Dai is backed by Ether at an agreed collateral ratio.
	Centralized Exchange (CEX)	Centralized Exchange (CEX) is an exchange that operates in a centralized manner and requires full custody of users' funds.
	Collateral	Collateral is an asset you will have to lock-in with the lender in order to borrow another asset. It acts as a guarantor that you will repay your loan.
	Collateral Ratio	Collateral ratio refers to the maximum amount of asset that you can borrow after putting collateral into a DeFi decentralized application.
	cTokens	cTokens are proof of certificates that you have supplied tokens to Compound's liquidity pool.

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	Cryptoasset	Cryptoasset refers to digital assets on blockchain. Cryptoassets and cryptocurrencies generally refer to the same thing.
	Cover Amount	It refers to the maximum payable money by the insurance company when a claim is made.
	Claim Assessment process	It is the obligation by the insurer to review the claim filed by an insurer. After the process, the insurance company will reimburse the money back to the insured based on the Cover Amount.
	Composability	Composability is a system design principle that enables applications to be created from component parts.
D	Decentralized Finance (DeFi)	DeFi is an ecosystem that allows for the utilization of financial services such as borrowing, lending, trading, getting access to insurance, and more without the need to rely on a centralized entity.
	Decentralized Applications (Dapps)	Applications that run on decentralized peer-to-peer networks such as Ethereum.
	Decentralized Autonomous Organization (DAO)	Decentralized Autonomous Organizations are rules encoded by smart contracts on the blockchain. The rules and dealings of the DAO are transparent and the DAO is controlled by token holders.
	Decentralized Exchange (DEX)	Decentralized Exchange (DEX) allows for trading and direct swapping of tokens without the need to use a centralized exchange.
	Derivatives	Derivative comes from the word derive because it is a contract that derives its value from an underlying entity/product. Some of the underlying assets can be commodities, currencies, bonds, or cryptocurrencies.

Index	Term	Description
	Dai Saving Rate (DSR)	The Dai Savings Rate (DSR) is an interest earned by holding Dai over time. It also acts as a monetary tool to influence the demand of Dai.
	Dashboard	A dashboard is a simple platform that aggregates all your DeFi activities in one place. It is a useful tool to visualize and track where your assets are across the different DeFi protocols.
E	Ethereum	Ethereum is an open-source, programmable, decentralized platform built on blockchain technology. Compared to Bitcoin, Ethereum allows for scripting languages which has allowed for application development.
	Ether	Ether is the cryptocurrency that powers the Ethereum blockchain. It is the fuel for the apps on the decentralized Ethereum network
	ERC-20	ERC is an abbreviation for Ethereum Request for Comment and 20 is the proposal identifier. It is an official protocol for proposing improvements to the Ethereum network. ERC-20 refers to the commonly adopted standard used to create tokens on Ethereum.
	Exposure	Exposure refers to how much you are ‘exposed’ to the potential risk of losing your investment. For example, price exposure refers to the potential risk you will face in losing your investment when the price moves.
F	Future Contract	It is a contract which you enter to buy or sell a particular asset at a certain price at a certain date in the future.
	Factory Contract	It is a smart contract that is able to produce other new smart contracts.
G	Gas	Gas refers to the unit of measure on the amount of computational effort required to

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H		execute a smart contract operation on Ethereum.
I	IDO	IDO stands for Initial Decentralized Exchange Offering or Initial DEX offering. This is where tokens are first offered for sale to the public using a DEXs liquidity pools.
	IMAP	IMAP stands for Internet Message Access Protocol. It is an Internet protocol that allows email applications to access email on TCP/IP servers.
	Impermanent Loss	Temporary loss of funds due to volatility leading to divergence in price between token pairs provided by liquidity providers.
	Index	An index measures the performance of a basket of underlying assets. An index moves when the overall performance of the underlying assets in the basket moves.
	Inverse	This Synthetix strategy is meant for those who wish to “short” a benchmark. Traders can purchase this when they think a benchmark is due to decrease.
J		-
K	Know-Your-Customer (KYC)	Know-Your-Customer (KYC) is a compliance process for business entities to verify and assess their clients.
L	Liquidation penalty	It is a fee that a borrower has to pay along with their liquidated collateral when the value of their collateral asset falls below the minimum collateral value.
	Liquidity Pools	Liquidity pools are token reserves that sit on smart contracts and are available for users to exchange tokens. Currently the pools are mainly used for swapping, borrowing, lending, and insurance.
	Liquidity Risk	A risk when protocols like Compound could run out of liquidity.

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	Liquidity Providers	Liquidity providers are people who loan their assets into the liquidity pool. The liquidity pool will increase as there are more tokens.
	Liquidity Pool Aggregator	It is a system which aggregates liquidity pools from different exchanges and is able to see all available exchange rates in one place. It allows you to compare for the best possible rate.
	Leverage	It is an investment strategy to gain higher potential return of the investment by using borrowed money.
M	MakerDAO	MakerDAO is the creator of Maker Platform and DAO stands for Decentralized Autonomous Organisation. MakerDAO's native token is MKR and it is the protocol behind the stablecoins, SAI and DAI.
	Market Maker Mechanisms	A Market Maker Mechanism is an algorithm that uses a bonding curve to quote both a buy and a sell price. In the crypto space, Market Maker Mechanism is mainly used by Uniswap or Kyber to swap tokens.
	Margin Trading	It is a way of investing by borrowing money from a broker to trade. In DeFi, the borrowing requires you to collateralize assets.
	MKR	Maker's governance token. Users can use it to vote for improvement proposal(s) on the Maker Decentralized Autonomous Organization (DAO).
	Mint	It refers to the process of issuing new coins/tokens.
N		-
O	Order book	It refers to the list of buying and selling orders for a specific asset at various price levels.

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	Over-collateralization	Over-collateralization refers to the value of collateral asset that must be higher than the value of the borrowed asset.
	Option	Option is a right but not the obligation for someone to buy or sell a particular asset at an agreed price on or before an expiry date.
P	Price discovery	Price discovery refers to the act of determining the proper price of an asset through several factors such as market demand and supply.
	Protocol	A protocol is a base layer of codes that tells something on how to function. For example, Bitcoin and Ethereum blockchains have different protocols.
	Peer-to-Peer	In blockchain, “peer” refers to a computer system or nodes on a decentralized network. Peer-to-Peer (P2P) is a network where each node has an equal permission to validating data and it allows two individuals to interact directly with each other.
Q		-
R	Range Bound	This TokenSets strategy automates buying and selling within a designated range and is only intended for bearish or neutral markets.
	Rebalance	It is a process of maintaining a desired asset allocation of a portfolio by buying and selling assets in the portfolio.
	Risk Assessor	Someone who stakes value against smart contracts in Nexus Mutual. He/she is incentivized to do so to earn rewards in NXM token, as other users buy insurance on the staked smart contracts.
S	Smart Contracts	A smart contract is a programmable contract that allows two counterparties to set conditions of a transaction without needing to trust another third party for the execution.

Index	Term	Description
	Stablecoins	A stablecoin is a cryptocurrency that is pegged to another stableasset such as the US Dollar.
	Spot market	Spot market is the buying and selling of assets with immediate delivery.
	Speculative activity	It is an act of buying and selling, while holding an expectation to gain profit.
	Stability Fee	It is equivalent to the ‘interest rate’ which you are required to pay along with the principal debt of the vault.
	Slippage	Slippage is the difference between the expected price and the actual price where an order was filled. It is generally caused by low liquidity.
	Synths	Synths stand for Synthetic Assets. A Synth is an asset or mixture of assets that has/have the same value or effect as another asset.
	Smart Contract Cover	An insurance offer from Nexus Mutual to protect users against hacks in smart contracts that stores value.
T	TCP/IP	It stands for Transmission Control Protocol/Internet Protocol. It is a communication protocol to interconnect network devices on the internet.
	Total Value Locked	Total Value Locked refers to the cumulative collateral of all DeFi products.
	Technical Risk	It refers to the bugs on smart contracts which can be exploited by hackers and cause unintended consequences.
	Trading Pairs	A trading pair is a base asset that is paired with its target asset in the trading market. For example, for the ETH/DAI trading pair, the base asset is ETH and its target pair is DAI.
	Trend Trading	This strategy uses Technical Analysis indicators to shift from 100% target asset to

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		100% stableasset based on the implemented strategy.
	Tokens	It is a unit of a digital asset. Token often refers to coins that are issued on existing blockchain.
	Tokenize	It refers to the process of converting things into digital tradable assets.
U		-
V	Value Staked	It refers to how much value the insurer will put up against the target risk. If the value that the insurer staked is lower than the target risk, then it is not coverable.
W	Wallet	A wallet is a user-friendly interface to the blockchain network that can be used as a storage, transaction and interaction bridge between the user and the blockchain.
X		-
Y		-
Z		-