

Decentralized Finance

Stablecoins

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 Stanford
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A nighttime satellite view of Earth from space, showing city lights and cloud formations.

Background

Economic Models

- You're given a model
 - Represents (often simplifies) an economic process
 - Contains variables
 - Logical/Quantitative relationships between variables
- Example: **Inflation**
 - Measuring inflation requires a *behavior model*
 - Differentiate relative vs. inflation price change

Variables in DeFi/Stablecoins

- Interest rate(s) in CeFi and in DeFi
- Cryptocurrency price
- Collateral ratio
- DeFi Protocol fees
- Blockchain Transaction fees
- Number of users
- Blockchain transaction throughput
- etc.

Exogenous vs. Endogenous

- Exogenous Variable == outside force
 - Determined outside the model, imposed on the model
 - **Example:** In MakerDAO, the asset price of the collateral (e.g. ETH), is independent of the MakerDAO system.
- Endogenous Variable == inside the model
 - Determined by the model.
 - **Example:** In Synthetix, arbitrary derivatives are backed by SNX collateral, i.e. project internal tokens.

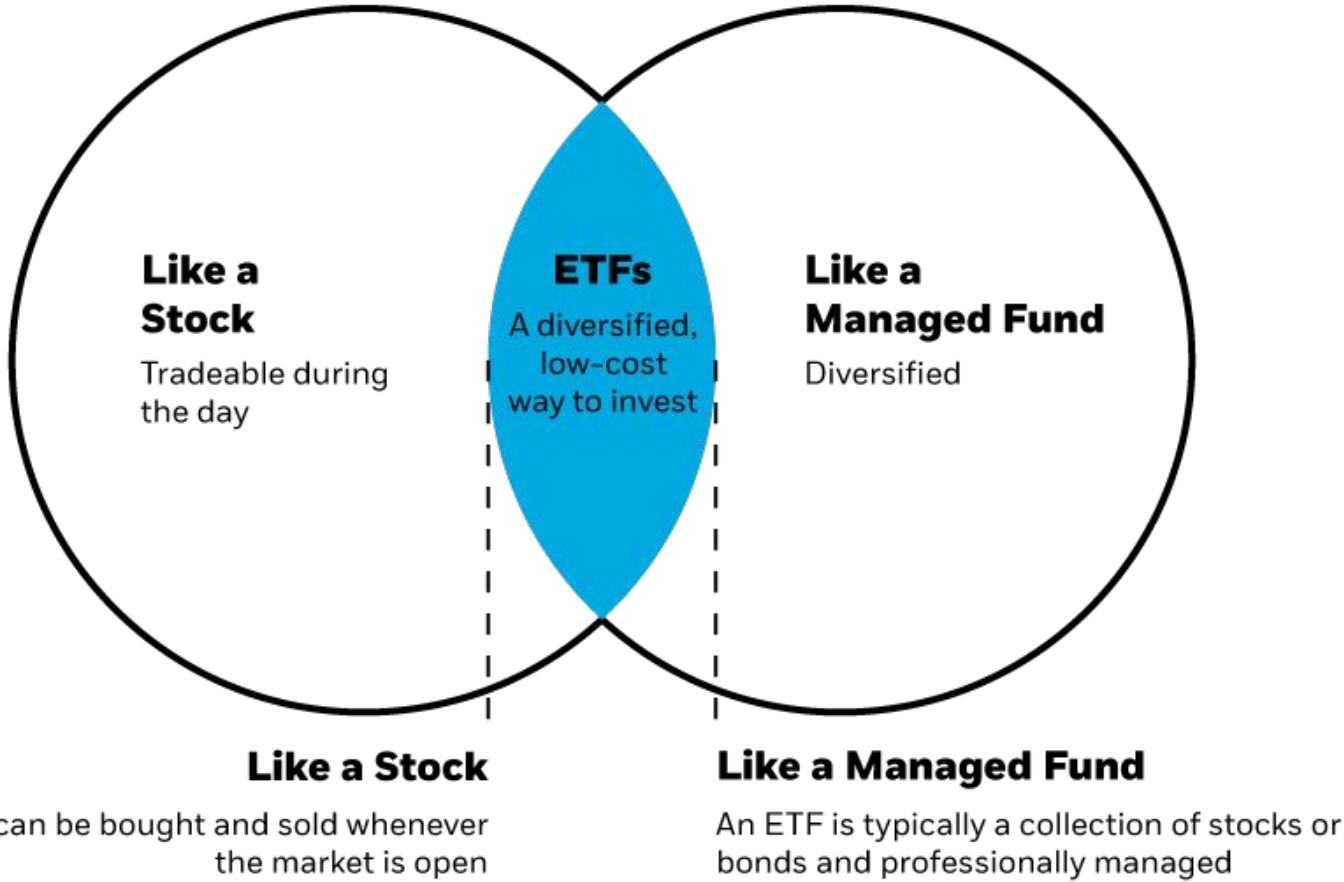
(Fractional) Reserve



$$\text{Bank's reserve ratio} = \frac{\text{Money held by the bank}}{\text{Money deposited by bank customers}}$$



Exchange Traded Fund (ETF)



Exchange Traded Fund (ETF)

- A security/asset
 - Tracking an index/sector/commodity
 - Tradable on an exchange
 - Typically, lower fees than buying individual stocks
 - ETF types: Bond, Stock, Industry, Commodity, Currency, Inverse, etc.
- Example: SPDR S&P 500 ETF tracks the S&P 500 index



Stablecoin Basics

<https://defi-learning.org>

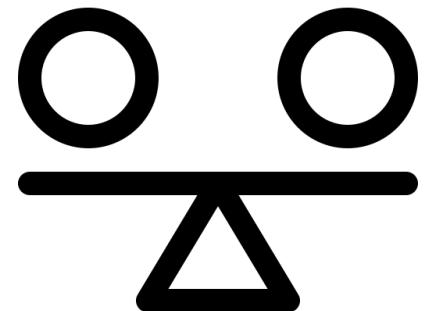
Why Stablecoins?

Bitcoin (BTC) Price Chart



What is “stable”?

- **Stability:**
 - ..is a relative metric
 - Volatility, standard deviation of returns
 - Worst drop over a timeframe
 - Fiat, e.g. EUR, GBP have a volatility of 6-12%
- Volatility alone does not capture the range of prices



Stable and Pegged coins



USDC



USDT



DAI



WBTC



renBTC



sETH



stETH

USD derivatives

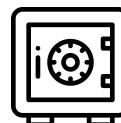
Pegged coins

■ Stablecoin Types

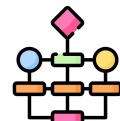
- Reserve-based



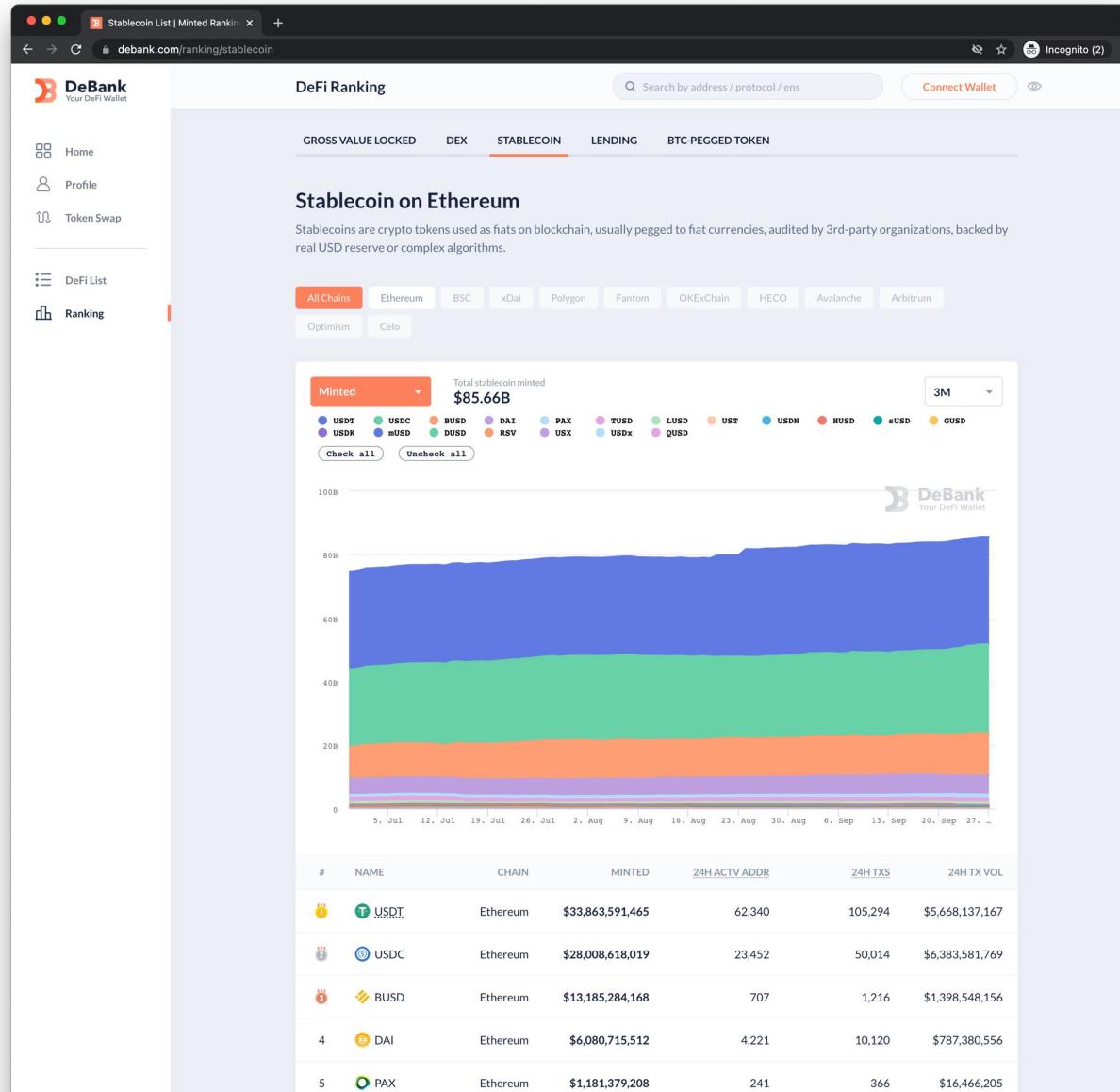
- Collateral-based



- Algorithmic



Stablecoins on Ethereum



Stable?

Inflation Calculator

If in (enter year)

I purchased an item for \$

then in (enter year)

that same item would cost: **\$3.32**

Cumulative rate of inflation: **232.0%**

CALCULATE

“Stablecoins” are not “stable”, but relatively more stable than other cryptocurrencies.

How do Stablecoins work?



MakerDAO



Synthetix



AMPL



USDC

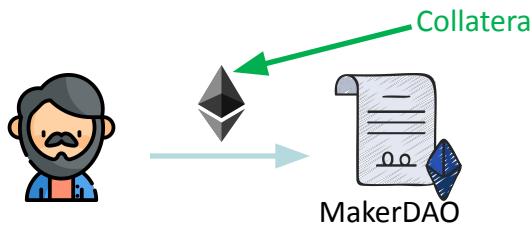


USDT

MakerDAO

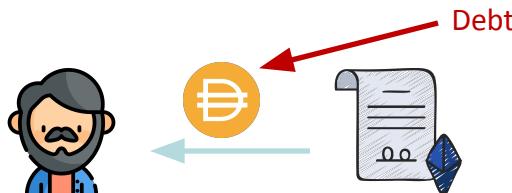
Stablecoin

Step 1



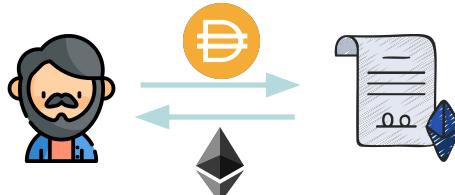
ETH deposited to open CDP
150% collateral mints 100% debt

Step 2



Draw DAI

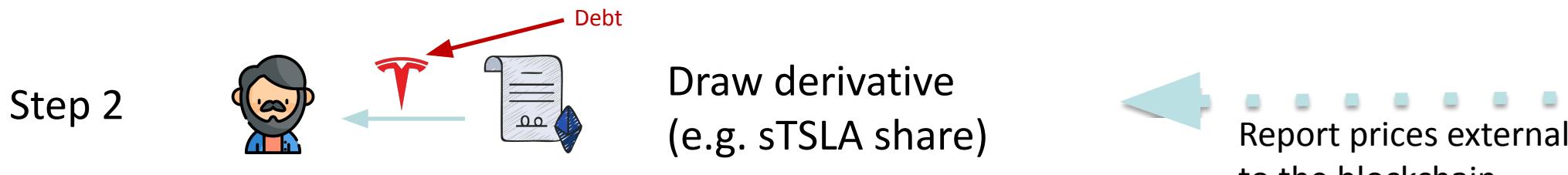
Step 3



Pay back DAI to unlock ETH

Synthetix

Mint a derivative asset



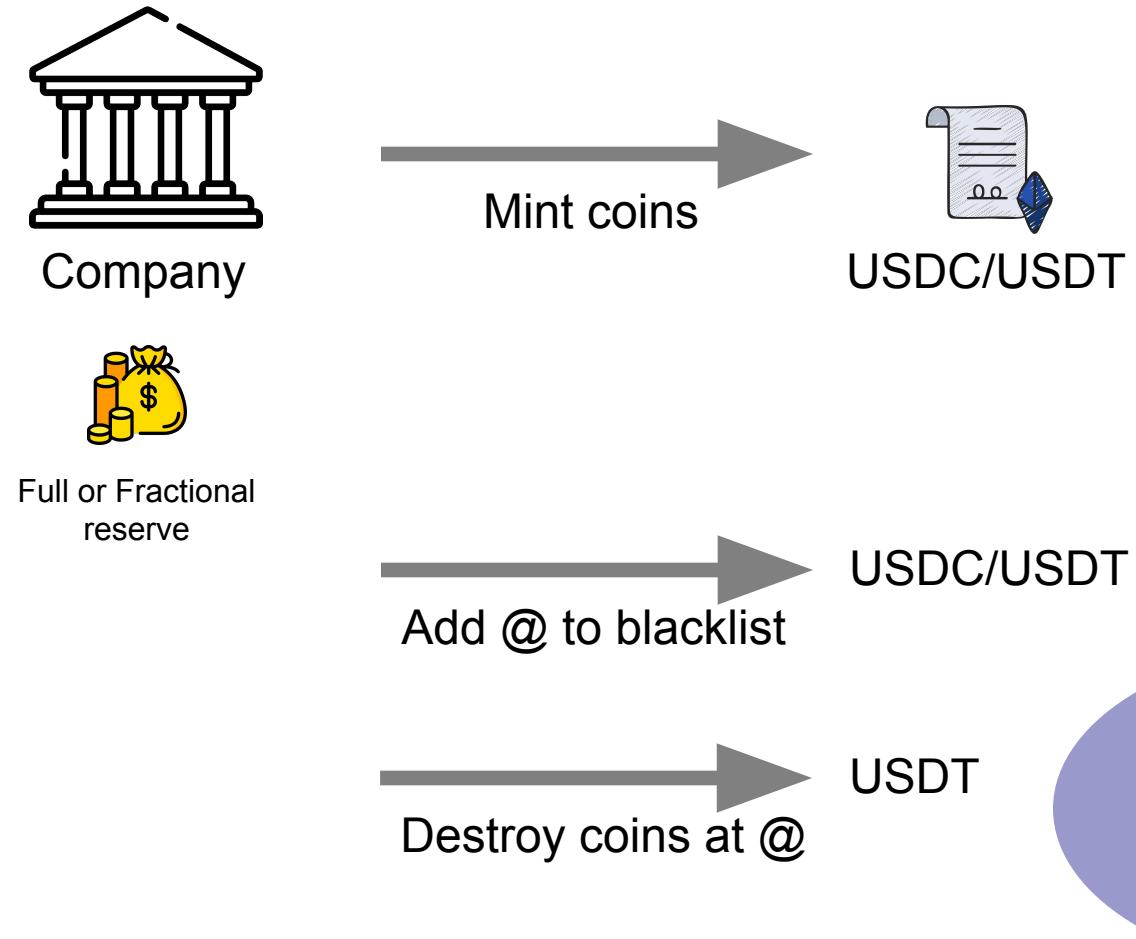
Ampleforth (AMPL)



- Three design states
 - Expansion: if $1 \text{ AMPL} > 1 \text{ USD}$, add supply
 - Contraction: if $1 \text{ AMPL} < 1 \text{ USD}$, remove supply
 - Equilibrium: no action taken

Systemic implications!

USDC and USDT



USDT blacklisted over 400 accounts, +44M USDT destroyed.

USDC and USDT

```
1  function transfer(address _to, uint _value) public
2      whenNotPaused {
3          require(!isBlackListed[msg.sender]);
4          if (deprecated) {
5              return UpgradedStandardToken(upgradedAddress).
6                  transferByLegacy(msg.sender, _to, _value);
7          } else {
8              return super.transfer(_to, _value);
9          }
10     }
11     function addBlackList (address _evilUser) public
12         onlyOwner {
13         isBlackListed[_evilUser] = true;
14         AddedBlackList(_evilUser);
15     }
16     function destroyBlackFunds (address _blackListedUser)
17         public onlyOwner {
18         require(isBlackListed[_blackListedUser]);
19         uint dirtyFunds = balanceOf(_blackListedUser);
20         balances[_blackListedUser] = 0;
21         _totalSupply -= dirtyFunds;
22         DestroyedBlackFunds(_blackListedUser, dirtyFunds);
23     }
```

DeFi Bank Run?

- CeFi Bank Run
 - Dangerous if fractional reserve
 - Most clients don't receive assets (or a minimum)
- DeFi Bank Run
 1. Event: USDT blacklists a pool, Stablecoin de-pegs
 2. Traders will exit pools
 3. Those who exit first receive the best prices
 4. Try to build blacklist detection bots

