Course II:

DeFi Primitives

3. Swaps and Loans

(ii) Collateralized Loans

Collateralized loans

Role of debt and lending in DeFi

- Debt and lending are perhaps the most important financial mechanisms that exist in DeFi, and in traditional finance.
- Any loan of non-zero duration (e.g., foreshadowing flash loan) must be backed by an equivalent or excess amount of collateral.
- Requiring collateral contractually prevents a counterparty from defaulting.
- An uncollateralized mechanism raises the risk that a counterparty could steal funds, especially in an open and anonymous system such as Ethereum.

Collateralized loans

Foreclosure risk

- A risk of overcollateralized positions is that the collateral becomes less valuable than the debt, leading to a foreclosure without an option for recovery.
- Therefore, more-volatile types of collateral require larger collateralization ratios in order to mitigate this risk.

Collateralized loans

Liquidation

- To avoid liquidation it is imperative that debt remain overcollateralized by a margin sufficiently large that moderate price volatility does not place the collateral value in jeopardy.
- Smart contracts commonly define a minimum collateralization threshold below which the collateral can be liquidated and the position closed.
- The collateral could be auctioned or directly sold on a DEX, likely with an AMM, at the market price.

Collateralized loans

Liquidation trigger

- Positions in the Ethereum blockchain cannot be liquidated automatically, so an incentive is needed.
- The incentive often takes the form of a percentage fee allocated to an external **keeper** who is able to liquidate the position and collect the reward.
- Any remaining collateral is left to the original holder of the position.
- In some cases, the system will leave all remaining collateral to the keeper as a stronger incentive.
- Because the penalty for liquidation is high and most collateral types are volatile, platforms generally allow users to top up their collateral to maintain healthy collateralization ratios.

Collateralized loans

Collateralization can back a token

- An implication of collateralized loans and token supply adjustment is that collateralization can back the value of a synthetic token.
- The synthetic token is an asset created and funded by a debt, which is the requirement to repay the synthetic token in order to reclaim the collateral.
- The synthetic token can have a utility mechanism or represent a complex financial derivative, such as an option or bond (e.g., Synthetix Synth and Yield yToken). A stablecoin that tracks the price of an underlying asset can also be a synthetic token of this type (e.g., MakerDAO DAI).