MakerDAO
An Overview
Law 1078
Spring 2023
Business Purpose

• To create and maintain a stablecoin (DAI) soft-pegged to the US dollar by collateralizing its issuance with cryptocurrencies

• To operate the system in a decentralized fashion
  • Compare: fiat-backed US dollar stablecoins such as USD Coin (USDC) or Tether (USDT)
    • These are backed by deposits of US dollars and various financial instruments
    • This backing and the redemptions require centralized operation
  • The system is managed by holders of Maker (MKR) governance tokens
    • Key parameters of the system such as which cryptocurrencies may be used as collateral and the required degree of overcollateralization are decided by votes by the MKR token holders
    • One MKR token locked in a voting contract = one vote
Maker Foundation and Dai Foundation

• Maker Foundation
  • Centralized element
  • started up the system by launching Maker Protocol, bootstrapping decentralized governance
  • plan was that the DAO will take full control, conduct MKR votes, fill out DAO team roles; far along that road now
  • Too big a foundation role → may be considered centralized

• Dai Foundation
  • Safeguards what cannot be technologically decentralized in Maker Protocol
    • E.g., trademarks, code copyrights
  • Objective and rigid rules embedded → weaken possible claim that have centralized management
Operation: Vaults

• To generate Dai, the user:
  • Creates and collateralizes a Maker Vault (a smart contract)
  • Generates Dai from the collateralized Vault (a transaction)
  • Pays back the Dai and pays a Stability Fee
  • Can withdraw collateral then; Vault remains open until another deposit

• Vaults
  • User has a separate Vault for each collateral type
    • The smart contract code embodying the Vault imposes risk parameters specific to that collateral type
  • Non-custodial
    • Users interact with the Vault and the Maker Protocol directly

• Collateral assets
  • ERC-20 tokens approved by the MKR holders as acceptable collateral types
  • MKR holders also approve risk parameters
Risk Parameters

• Debt Ceiling
  • A system-wide collateral maximum for each collateral type
  • Ensures diversification across collateral types
  • The ceiling is reached → cannot create more Dai using that collateral type

• Stability Fee
  • At an annual percentage rate
  • Paid in DAI to the Maker Buffer

• Liquidation Ratio
  • Collateral/debt(Dai issued)
  • Liquidate via automated Maker Protocol if fall below the Ratio
Risk Parameters II

• Liquidation Penalty
  • Collateral auctioned for Dai, goal is enough Dai to cover Vault obligations plus the Liquidation Penalty
  • The Liquidation Penalty creates an incentive to maintain appropriate collateral levels
Operation: Liquidation

• Maker Protocol auction initiated if fall below Liquidation Ratio
  • Auction the collateral for Dai; no external price information required
  • Collateral Auction first: highest Dai per collateral unit wins
    • Hopefully get enough Dai to cover Vault obligations and pay Liquidation Penalty
  • Reverse Collateral Auction second: highest collateral/Dai first
    • Goal is to sell as little collateral as possible and still meet the obligations and penalty
    • Possible that remaining collateral will be returned to Vault owner

• Deficit situation: Collateral Auction does not raise enough Dai, then:
  • Deficit converted into Protocol debt and paid out of Maker Buffer
  • Not enough in Maker Buffer → Debt Auction: MKR minted by system and sold to bidders for Dai
Risk Parameters III

• Collateral Auction Duration (maximum)
  • The auction ends after this period under all circumstances

• Auction Bid Duration
  • Length of time from previous bid that terminates the auction

• Auction Step Size
  • Incentivize early bids
  • Prevent abuse of tiny increments
Operation: Maker Buffer

- Maker Buffer ("MB") has inputs and outputs; some important ones:
  - Stability Fees (interest rate on collateral balances) go into MB
  - Daily Savings Rate (interest on Dai deposited into a Daily Savings Rate contract) is paid from MB
  - Collateral Auction proceeds are paid into MB

- Debt Auction when MB inadequate: MKR minted and auctioned for Dai
  - Additional MKR $\rightarrow$ total supply increases (dilutive) $\rightarrow$ downward pressure on price
  - A negative outcome for MKR holders

- Surplus Auction if MB exceeds the Maker Buffer Limit (set by MKR holders)
  - Auction Dai for MKR; the MKR is burned
  - Reduction in MKR $\rightarrow$ total supply decreases $\rightarrow$ upward pressure on price
  - A positive outcome for MKR holders
Operation: Maker Buffer II

• The Maker Buffer dynamics incentivize MKR governance token holders

• Example: liquidation parameters
  • Lower Liquidation Ratios and Liquidation Penalties →
    • Higher likelihood of liquidations, which may deplete MB and cause a dilutive Debt Auction
    • More deposits and increased Stability Fees, which may fill MB past the MB Limit and cause a Surplus Auction
  • The costs and benefits accrue to the MKR holders by affecting the value of their governance tokens
Decentralization

• Idea: transparent, trustless, permission-less
  • Avoid reliance on central-entity control and the required trust
    • E.g. the USDC problems when SVB failed
      • Trusted USDC to operate the fiat-currency backing safely
      • USDC trusted SVB (although also diversified across banks)
  • Transparent
    • MKR and DAI are ERC-20 tokens, built on the Ethereum blockchain
    • All DAI transactions and the operation of the Maker system are publicly viewable on the Ethereum blockchain; an unalterable history
  • Avoid Abuse
    • centralized digital currencies (private or CBDC) have danger that the administrators will compromise privacy (monitor users) or abuse their authority
Stabilization: One Method is Dai Savings Rate

• Can earn a savings return by locking DAI into a Dai Savings Rate (DSR) contract in Maker Protocol
  • No minimum and can withdraw anytime

• Modifying the DSR is a key stabilization device
  • Goal is to hold DAI as close to $1 as possible
  • Reduce DSR → reduce savings demand → more DAI in circulation → price falls
  • Opposite effect if increase DSR
Key External Actors

• Keepers
  • Independent (usually automated) actors incentivized by arbitrage opportunities to provide liquidity
  • Help maintain DAI at its $1 target price
  • Participate in Surplus, Debt, and Collateral auctions

• Price Oracles
  • Information about the market prices of collateral assets to determine when to trigger liquidations
  • Prices drawn from Oracle Feeds, chosen by MKR voters
Key External Actors II

• Emergency Oracles
  • last line of defense against attack on governance process or Oracles
  • Able to freeze individual oracles and can unilaterally trigger an Emergency Shutdown
  • Selected by MKR voters

• DAO service teams
  • Contracted through Maker governance to provide specific services
  • Independent market actors not employed by Maker Foundation
  • Too big a foundation role → may be considered centralized
Governance of the Maker Protocol

• Anyone can submit proposals but only MKR holders can vote
  • Proposal contract embodies the proposed change
  • Polling to establish rough consensus before Executive Voting to enact

• MKR holders vote to:
  • Add new collateral asset types, change risk parameters, choose Oracle feeds, choose Emergency Oracles, trigger an Emergency Shutdown, upgrade the system
  • Can allocate funds from Maker buffer to pay for infrastructure needs and services
  • Flexibility is high, all in the hands of the MKR token holders
Emergency Shutdown

• Dangers of destabilized DAO due to market conditions or otherwise, malicious governance action
  • Also can be used for system upgrades

• Can only be initiated by Maker Governance
  • Directly by quorum of MKR deposited in Emergency Shutdown Module or through Emergency Oracle, which can act very fast without a vote

• Three phases
  • Maker Protocol shuts down; Vault owners withdraw excess collateral
  • Post-ES auction processing permitted; allow enough time to complete outstanding ones
  • DAI holders claim remaining relative amount of collateral from the system at target price
    • Claims are proportional regardless of timing of submission, could be a haircut
    • May sell DAI to Keepers to avoid having self-management of multiple kinds of collateral
DAI Stablecoin

• Many uses
  • Any stablecoin role; it is a good one
  • Especially as a unit of account in some blockchain dapps
  • Within Maker system to settle debts; e.g. close Vault after paying stability fee

• Success
  • Significant market cap, 5+ billion
  • History of stability; arguably as good or better than any major USD stablecoin; consider four crisis points with big drops in crypto prices (= DAI collateral)
    • Launched into post-COVID onset hurricane and sharp crypto price drops (Spring 2020)
      • Did as well as USDC, USDT
    • Robust to TerraUSD collapse (May 2022)
    • Robust to FTX crisis (November 2022)
    • Relatively robust to USDC crisis (March 2023)
DAI Price
USDC Price
USDT Price