

Lecture 7

—

Other DeFi Applications

Lending and Borrowing

TradFi & current ecosystem

TradFi - How to take out a loan

1. Capital deposit between 10% - 15%.
 - a. Immigrant discrimination in Germany? 40% (avg 20%).
2. Ask bank for a loan
 - a. Type of work (CDI/CDD)
 - b. Current fixed assets / debts
 - c. Health state and insurances
 - d. Histories - US Credit Scores vs German Schufa
3. Bank provides loan with interest rate and duration.
4. If you don't pay:
 - a. Debt Collection
 - b. Legal actions
 - c. Repossession



DeFi Lending- Overcollateralization due to anonymity

Loan to Value ratio (LTV) - The value of the collateral compared to the loan. Commonly 150%. This is also known as Collateralization Ratio (CR)

Liquidation Threshold - The point at which a loan is deemed to be under collateralized and actions are triggered in the smart contract.

LTV/LT - An example

We take out a loan of 1000 DAI. Simply assume DAI is a perfect stablecoin pegged at \$1 always. We put in some ETH as collateral. Currently 1 ETH is worth \$100.

Question 1 - How much ETH do we need to deposit for an LTV of 150%?

Solution 1 - We require \$1500 worth of ETH. $1500/100 = 15$ ETH

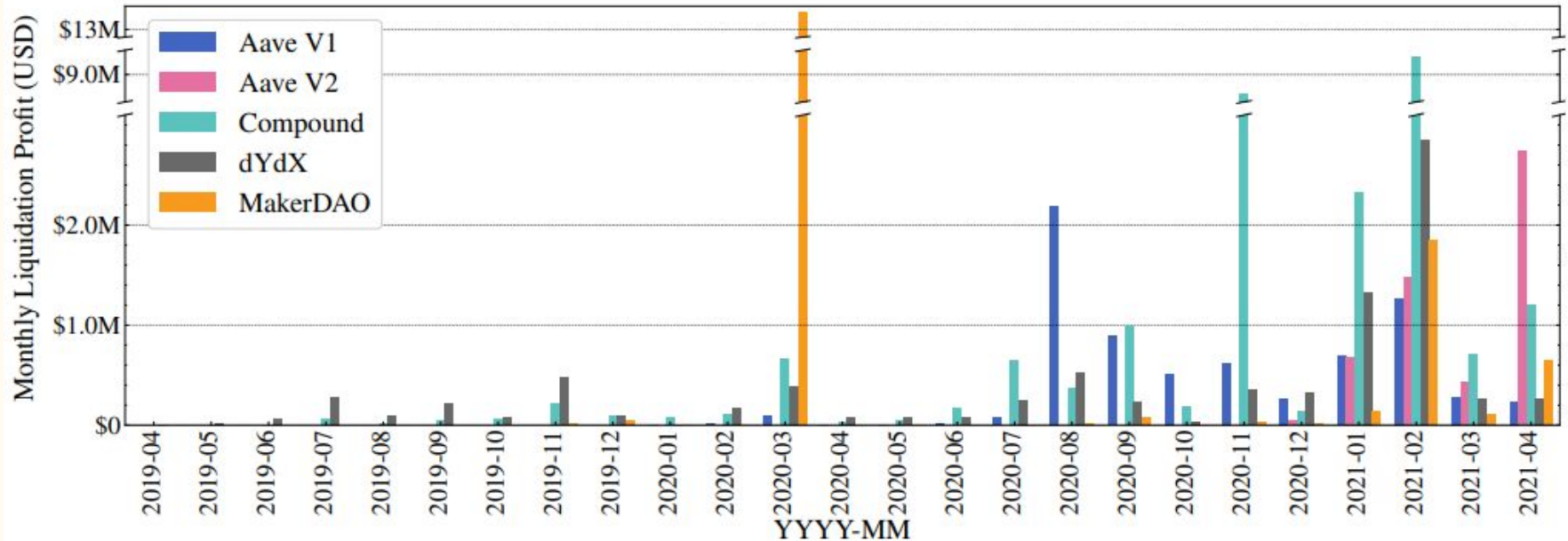
Question 2 - ETH prices drop by 10%. What is our new LTV?

Solution 2 - New price = \$90. $90 \times 15 = \$1350$. $1350/1000 = 135\%$

Question 3 - The liquidation threshold is set at 110%, how much can the price of ETH drop?

Solution 3 - LT = \$1100 of ETH. We put in 15 ETH. $1100/15 = 73.33$. About 27% drop in price.

What happens at LT? - Liquidations and profit

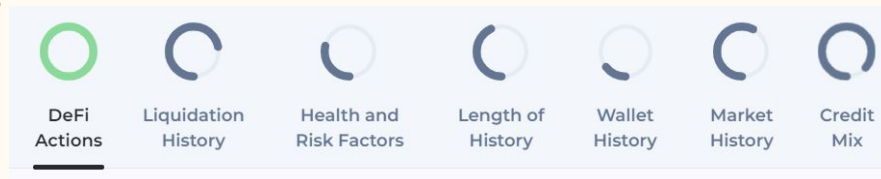
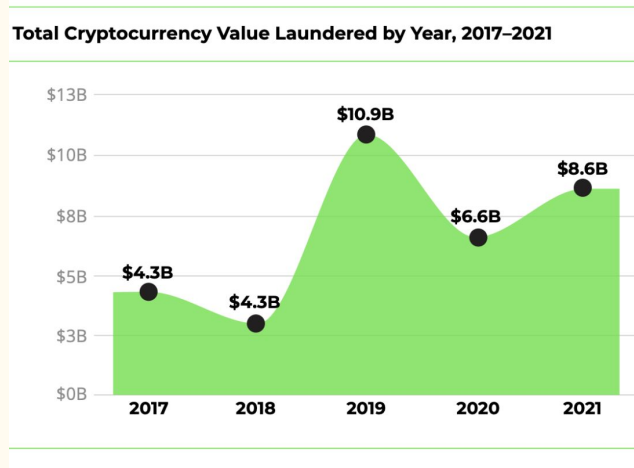


Occasionally, there can be massive bad debts and insolvency due to gas prices and liquidation mechanisms (remember gas and speed testing!)

Fair Collateralization - copying TradFi mechanisms

Using techniques found in TradFi:

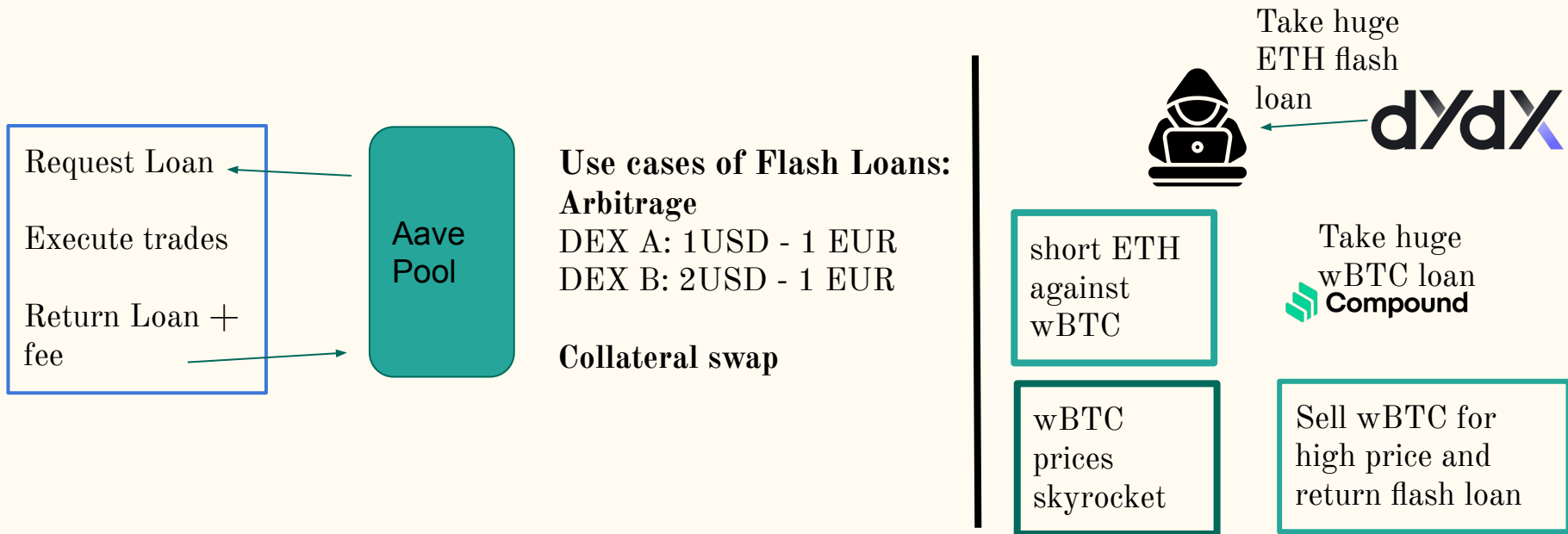
1. KYC & AML companies
 - a. Know your customer - identity, risk scoring and suspicious activity detection
 - b. Anti Money Laundering - KYC and token movement.
2. On chain credit scoring
 - a. Spectral Finance, similar to TradFi account check
 - b. Difficult to aggregate multiple identities across many protocols.
3. Soulbound Tokens - Onchain credit reputation
 - a. New concept proposed by Vitalik in May 2022. Increases NFT utility.
 - b. Aspects of living become "Souls" - eg. Medical records become "Medical Souls"
 - c. Credit Soul - Binance Account Bound token if you complete KYC



Under collateralization - Flash Loans

Take out a loan with no collateral? Okay if the loan can be repaid!

If the loan cannot be repaid, it never happened in the first place.



Bringing it all together

MakerDAO

CDP and Stability Fees

- DAI has a Liquidation threshold of 150%.
- Users open a collateralized Debt Position (CDP) with slightly higher collateralization ratio (avg 164%)
 - DAI Savings rate (demand generation mechanism)
 - Use DAI to buy more ETH for arbitrage
- Gets charged a **Stability Fee** - essentially the interest rate
 - Stability Fees paid upon repayment of DAI
 - Continuously calculated on DAI debt
 - Changes according to DAI mint and burn rates (supply control mechanism)
 - This is known as a soft pegging mechanism to control risk
- Repayment means a certain amount of DAI is burnt out of existence. If all goes well, DAI is minted and burned and some extra profit in the form of stability fees is harvested.

MakerDAO Keepers - stabilize the DAI peg

Smart Contract bots which continuously monitors for changes:

1. **Bite Keeper** - Monitor CDPs which falls under 150%
2. **Arbitrage keeper** - scans various DEXes for arbitrage opportunities
3. **CDP keeper** - manage open loans, set stability fees.
4. **Market Making Keeper** - market making activities for DAI on DEXes

[starknet-teleport-keeper](#)

Public

TypeScript ☆ 1 🍷 2 🔄 0 📄 0 Updated last week

[auction-demo-keeper](#)

Public

JavaScript ☆ 27 📄 Apache-2.0 🍷 17 🔄 3 📄 5 Updated on Jan 14

[market-maker-stats](#)

Public archive

Maker Keeper Framework: Set of tools to analyze market maker keepers performance.

Python ☆ 33 📄 AGPL-3.0 🍷 10 🔄 1 📄 2 Updated on Jul 15, 2022

[arbitrage-keeper](#)

Public archive

Maker Keeper Framework: Keeper to arbitrage on OasisDEX, 'join', 'exit', 'boom' and 'bust'. Efficiently handles both bad debt liquidations and surplus Dai.

Python ☆ 114 📄 AGPL-3.0 🍷 31 🔄 3 📄 2 Updated on Jul 15, 2022

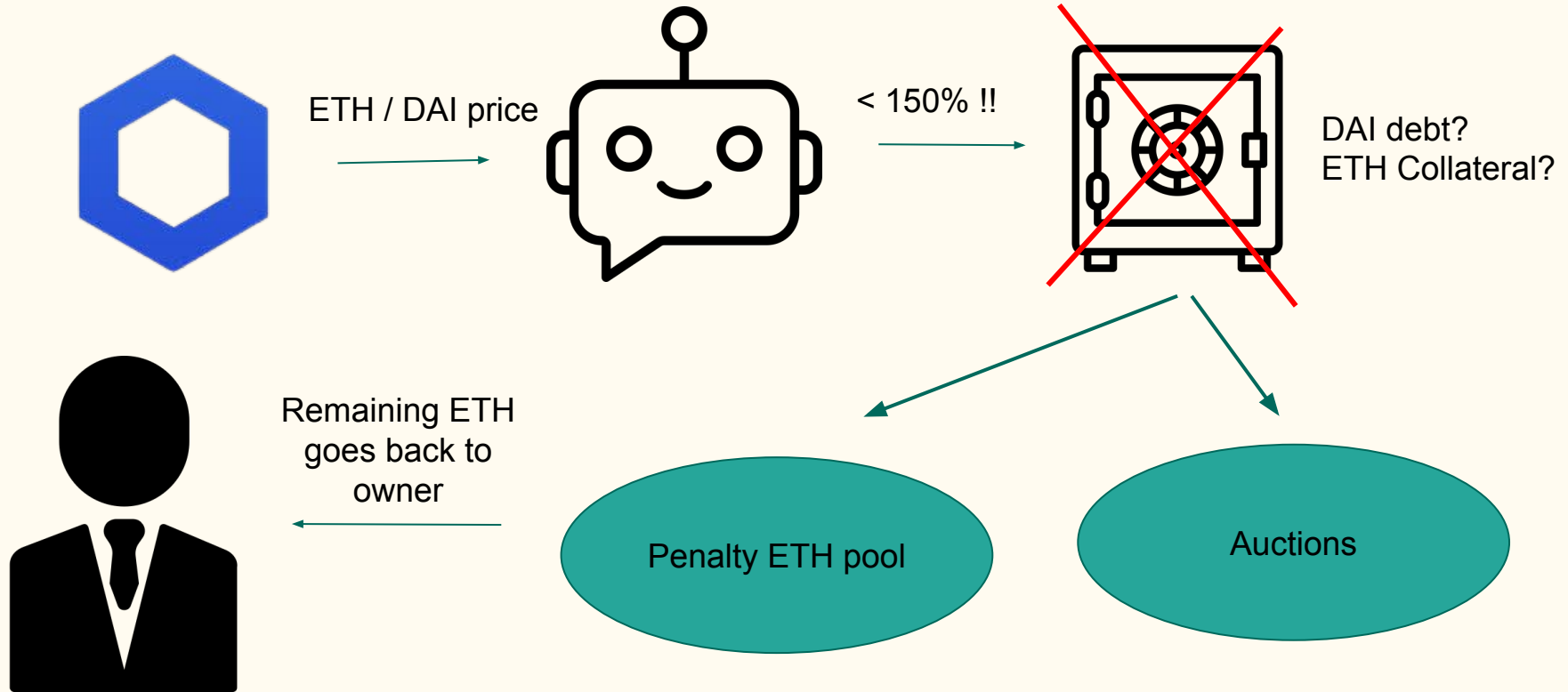
[market-maker-keeper](#)

Public

Maker Keeper Framework: Market maker keepers for OasisDEX, EtherDelta, 0x (RadarRelay, ERCdEX), Paradex, DDEX, IDEX, Bibox, Ethfinex, GoPax, HitBTC, TheOcean, OKEX and Gate.io.

Python ☆ 449 📄 AGPL-3.0 🍷 188 🔄 7 📄 3 Updated on Jul 15, 2022

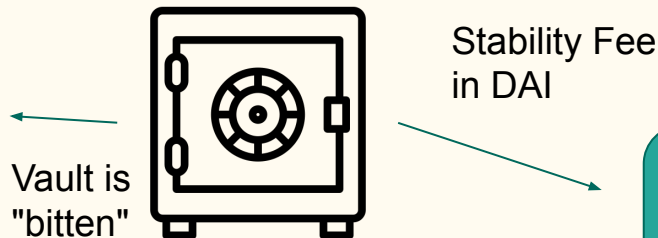
When things go bad - Liquidations



Auction Mechanisms

Collateral Auction

- Takes ETH available and starts auctioning for DAI.
- Bid Duration - Auction ends when no new bids within timeframe
- Auction Duration - Auction ends regardless



Buffer attempts to absorb bad debt

Surplus Auction

Triggered when total DAI and debt reaches a certain ratio.

DAI auctioned for MKR.

Received MKR gets burnt.
Decrease supply

Reverse collateral Auction

After initial interest and DAI availability, converts to auctions for purchasing DAI at decreasing ETH amounts

Debt Auction

No enough DAI was raised in the Collateral Auction. Not enough DAI in buffer. System in net debt state. Debt limit set through a vote. Reverse auction occurs. Amounts of DAI for decreasing amount of MKR tokens. MKR tokens gets minted. Supply increase.

Black Thursday

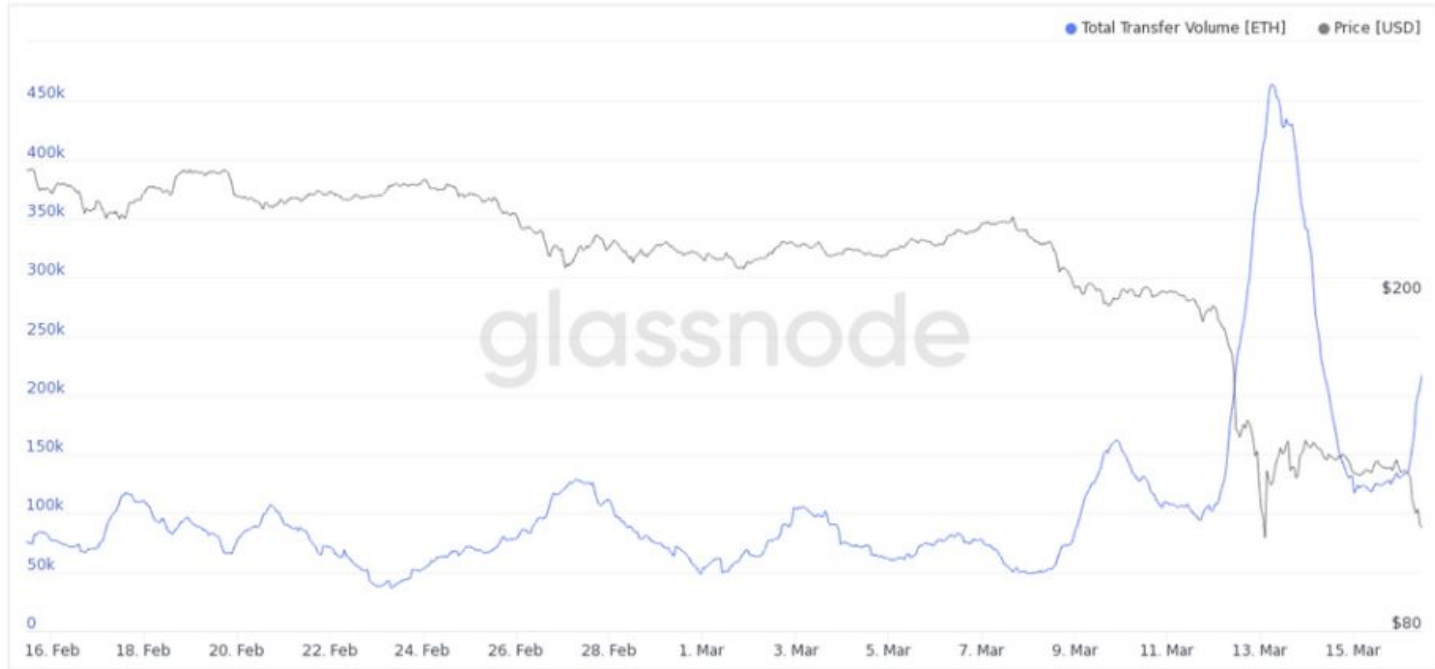
Irrationality overwhelms Technology

12 / 13 March 2020 - Financial markets fall



Investors scramble to move ETH into stablecoins

Ethereum: Transfer Volume (Total) (24h Moving Average)



High trading volumes spike gas prices

Ethereum: Gas Price (Mean)



Chainlink oracles fail, company suffers high gas fees

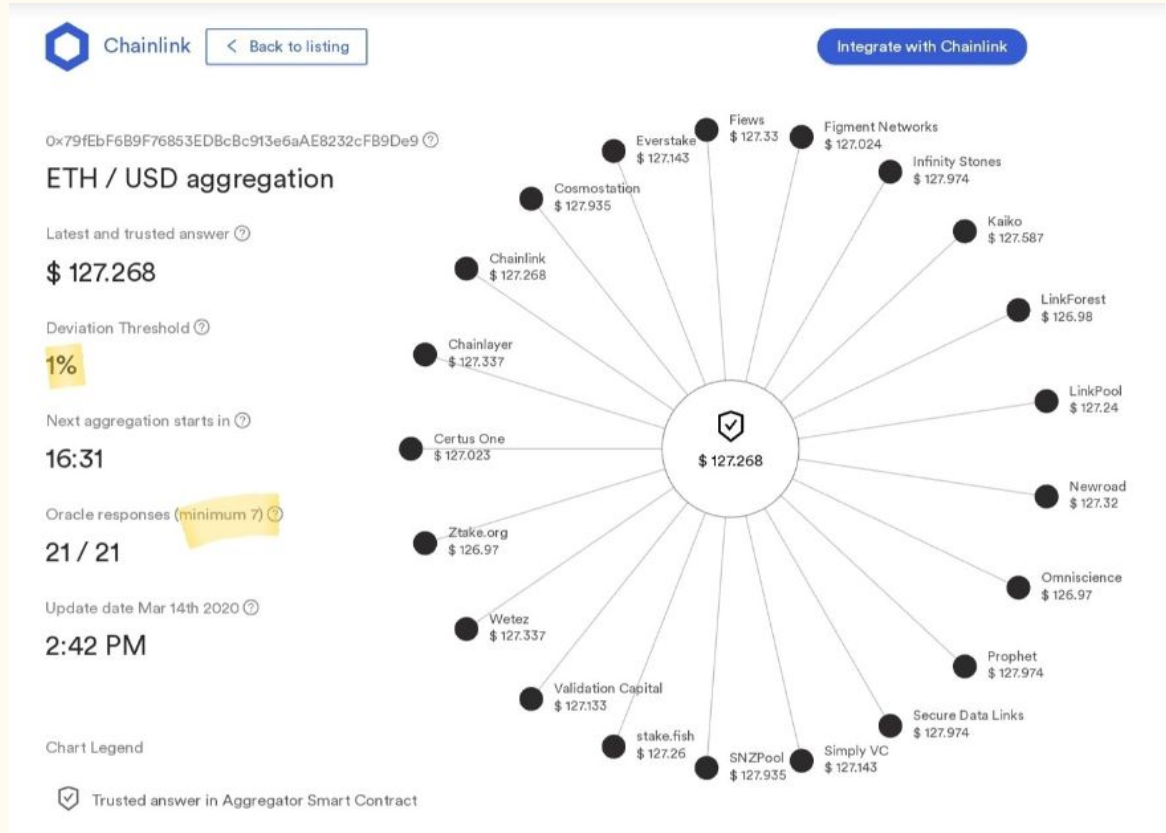
Default settings:

need 7 / 21 quorum
updates every 20min

Under congestion:

- Nodes could not get responses timely.
- Oracle starts requesting more often. Pay LINK and ETH gas to talk to nodes.
- Answers could not reach quorum, answers too stale.

Chainlink had SLAs to maintain. Paid heavily to keep things going.



Massive liquidations - All parties struggled

CDP owners - network so congested they could not add in more collateral or close their positions. Extremely high gas fees for any transaction.

Auctions - 1200 positions liquidated, 4447 auctions triggered

Keepers - So many auctions immediately drained available DAI that Keeper bots had.

Exchanges - became the only real source of liquidity, but could not determine prices due to oracles being overwhelmed or process the transactions due to network congestion.

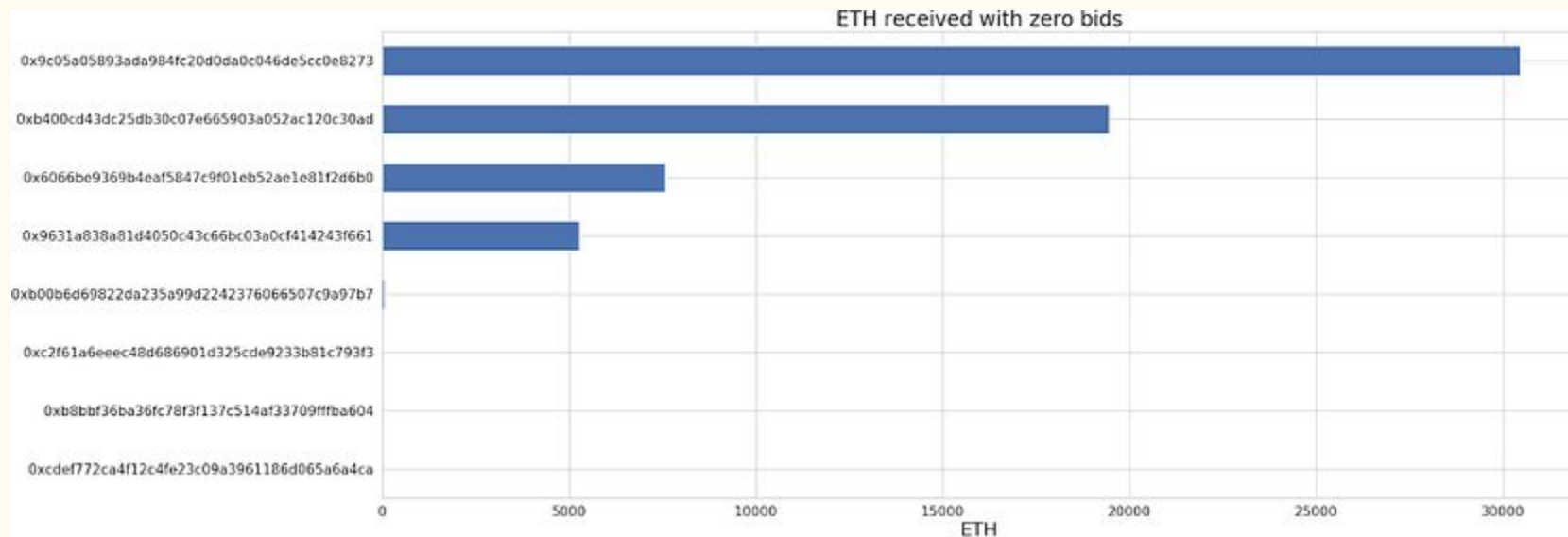
Unstoppable zero bids

\$13 Million worth of zero bids

DEAL >> 3/12/2020, 9:19:03 AM | ID: 789 | Paid Rate: \$0.00 dai/eth (~100.00%) ~ Won! | Price: \$166.47 | from: 0x9631...F661 | [Tx:...b6f Info](#) >>

DEAL >> 3/12/2020, 9:19:03 AM | ID: 788 | Paid Rate: \$0.00 dai/eth (~100.00%) ~ Won! | Price: \$166.47 | from: 0x9631...F661 | [Tx:...b51 Info](#) >>

DEAL >> 3/12/2020, 9:19:03 AM | ID: 787 | Paid Rate: \$0.00 dai/eth (~100.00%) ~ Won! | Price: \$166.47 | from: 0x9631...F661 | [Tx:...d00 Info](#) >>



Aftermath - MakerDAO votes for no compensation

Mint some new MKR tokens for debt auction? Supply increase, price decrease.

Plus some DAI compensation? Decrease in DSR, stability fees unattractive.

Proposal here:

<https://forum.makerdao.com/t/vault-compensation-plan-v2/3584>

Vote breakdown

POLL WINNER

0% (oppose vault compensation) - 0 MKR and 0 rounds DAI

0% (oppose vault compensation) - 0 MKR and MKR
0 DAI (65.52%)

18% - up to 18,216 MKR and 50,000 DAI 15,503.07 MKR (17.64%)

15% - up to 14,871 MKR and 50,000 DAI 14,683.57 MKR (16.70%)

24.67% (theoretical maximum auction yield) - up to 25,925 MKR and 50,000 DAI 117.97 MKR (0.13%)

Aftermath - US class action lawsuit

“While misrepresenting to CDP Holders the actual risks they faced, The Maker Foundation neglected its responsibilities to its investors by either fostering or, at the very least, allowing the conditions that led to Black Thursday, all after actively soliciting millions of dollars of investment into its ecosystem.”

Plaintiff: Class Action

Defendants: Maker Foundation, DAI Foundation, Maker Growth Foundation

Aftermath - MakerDAO wins \$28 Mil lawsuit

End of February 2023, MakerDAO wins lawsuit and do not need to compensate victims.

Plaintiff did not have sufficient supporting facts and evidence.

Maker Growth Foundation became MakerDAO. No more proper entity of defense.
Became fully decentralized.

MakerDAO 2.0

In response to Black Thursday

- Single collateral DAI (SAI), becomes Multi-collateral DAI (MCD / DAI). Maker releases a lot of new technical docs. All CDPs must upgrade to multi collateral vaults.
 - Diversification of collateral types
 - All parameters set separately - stability fee, auction durations, CRs.
- Liquidations 2.0
 - English to Dutch auctions - instant settlement. Faster auction = more liquidation efficiency
 - Flash Lending Collateral - self liquidation
 - Auctions can be reset due to time or price now
- Third party dApps to increase auction participation
- Some updates on Keeper wallets. Do not need to hold as much ETH and DAI