# Discussion of "Systemic Fragility in Decentralized Markets" by Alfred Lehar and Christine Parlour

Kathy Yuan (LSE and CEPR)

September 1, 2022

# Main Findings

- DeFi lending is automated and anonymous. The lending amount is over-collateralized and the collaterals are valued on chain
- Liquidation is also automated based on the market value (sourced from Oracle) of the collaterals
- The paper shows that there are temporary and permanent price impacts from liquidation decision on nine DEXs.

# Liquidation Mechanism

- No centralised authority
- Liquidation threshold is pre-set in smart contract and price based
- To trigger liquidation smart contract, someone has to be incentivised to do so when collateral price is still high enough to cover the loan
    - DeFi lending platforms would like to attract liquidators
    - Otherwise, have to pay for the realised cost of holding under-performing/collateralized loans when depositors withdraw the loan
    - Incentives: flash loans, share of the residual collaterals after liquidation
- Liquidation bot: decision only based on collateral price and amount

# Flash Loans

- DeFi loan: collateral
- Flash loan: no collateral but has be done in the same block
- Almost anyone can be liquidators, in the same block
  - return the borrowed token in the DeFi loan to the lender via taking out a flash loan
  - obtain the collateral in the DeFi loan
  - swap some of the collateral for the token in flash loan (in DEX) to close out the flash loan position
  - keep the residual collateral as profit
- Almost: still have to pay significant gas fee, higher fee for complicated liquidations
  - illiquid DEXs: some swaps have to be done in several DEXs to avoid high price impact
  - several flash loan lenders to lower the borrowing cost

# Main Empirical Results

- How much of the returns at five-block since liquidation can be explained by the immediate price impact of liquidation? That is, how persistent is the price impact of firesale?
  - 38.7% has persistent price impact
  - stronger price impact in shorter liquidation waves/the end of a wave
  - also affects DEXs without any direct liquidation trades (other cross DEX arbitrageurs at work)
  - higher gas fee (lower arbitrage activities) $\rightarrow$ larger price impact
- 5-minute return (15 sec per block) is more likely to be extreme and negative when there is a liquidation event when sampled from 16 tokens in 36 exchanges ...
- single liquidation: no price impact
- multiple liquidation: price impact
- predatory liquidation by profit-driven liquidators: excessive liquidation?

# Comments: Systemic Fragility of DeFi Liquidation

- Leverage investments are risky in real and crypto economies
- Shown to lead to firesale in downturns
- What is unique in DeFi to cause it?
  - Flash loan – more arb activities than real: expect less price impact
  - DEX – AMM and less liquid than real: expect more price impact
  - Profit driven liquidators: excessive liquidations?
  - Price-based rule: self-fulfilling liquidations?

# Comments: Regression Specifications

- Liquidity of DEX trading pools
  - examine whether this friction drives the persistent price impact of firesafe?
  - compare liquidation outcomes in illiquid and liquid pools
- Endogeneity
  - price impact is potentially fundamental driven (due to a systemic shock to the cryto economy)
  - single wave $\rightarrow$ no price impact
  - controlling for the return on broader crypto index (akin to controlling for the market return)
- Natural experiments?
  - shocks to price that due to non-fundamental related issues? (Say oracle changed the numeraire or the way to quote the price?)

# Conclusion

- Interesting paper
- Timely topic
- Impressive data work: all liquidation transactions from the archive node
- Detailed knowledge about DeFi
- Highly recommend reading it!