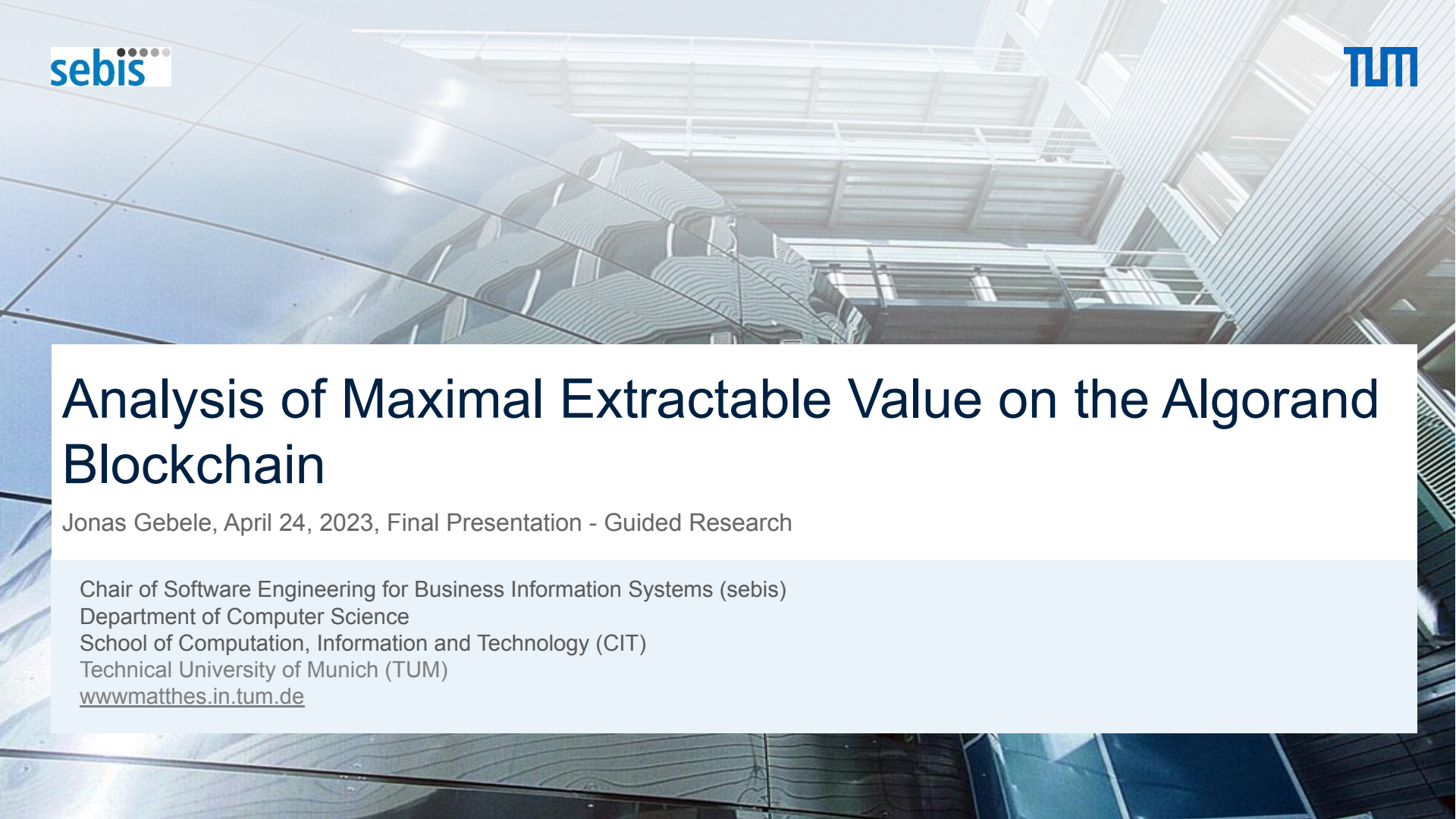

Analysis of Maximal Extractable Value on the Algorand Blockchain

Jonas Gebele, April 24, 2023, Final Presentation - Guided Research

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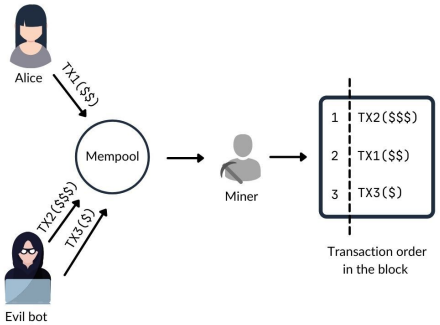
Outline

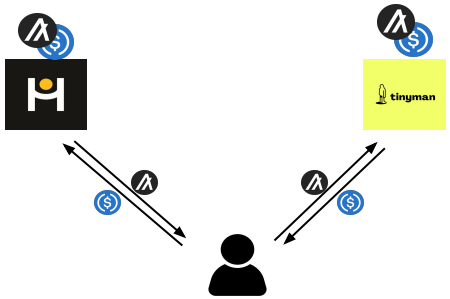
1. Motivation and Background Information
2. Problem Statement
3. Research Objectives & Results
   - 3.1. Analyze Theoretical Arbitrage-Related MEV on the Algorand Blockchain
   - 3.2. Identify Potential Opportunities for Profitable cross-DEX Arbitrage Transactions
   - 3.3. Analyze Behavior of Market Participants in the Algorand Ecosystem
4. Conclusion

Motivation and Background Information

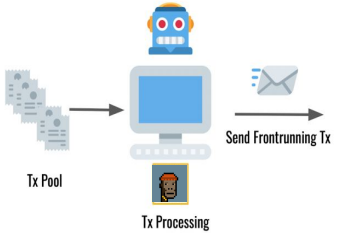
Types of MEV Strategies



Sandwich Attack



DEX Arbitrage



Front-Running
Back-Running
Liquidations

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Problem Statement

MEV Dynamics on Fixed Fee Blockchains

Dynamic Fee Blockchains

Fixed Fee Blockchains

Algorand

No Transaction Prioritization by Fee

Transaction Fees go to Algorand Foundation

Certain MEV only exploitable by block-producers

(network-level MEV)

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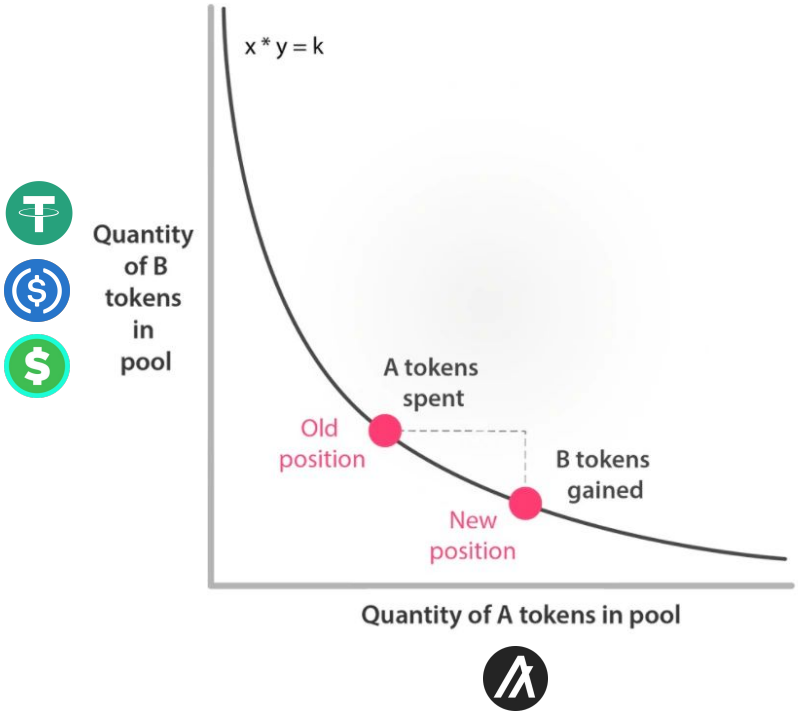
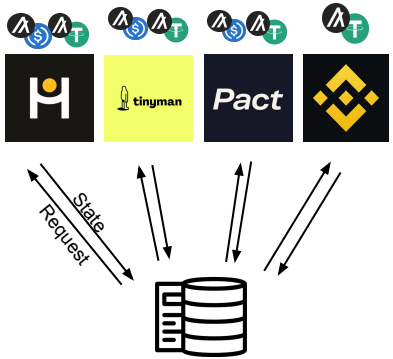


AMMs (Constant-Product Market Maker)

Continuous-Limit Order-Books

Research Objectives & Results

Analyze Theoretical Arbitrage-Related MEV on the Algorand Blockchain

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0.18465,0.185404,0.194214,0.184586,0.182313,0.184843,0.187997
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Research Objectives & Results

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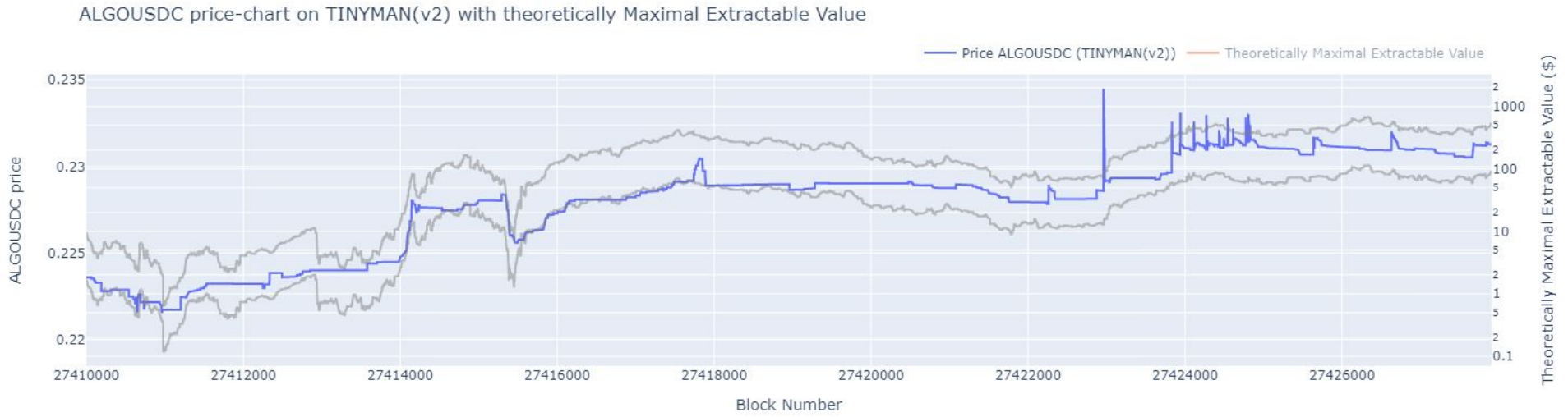

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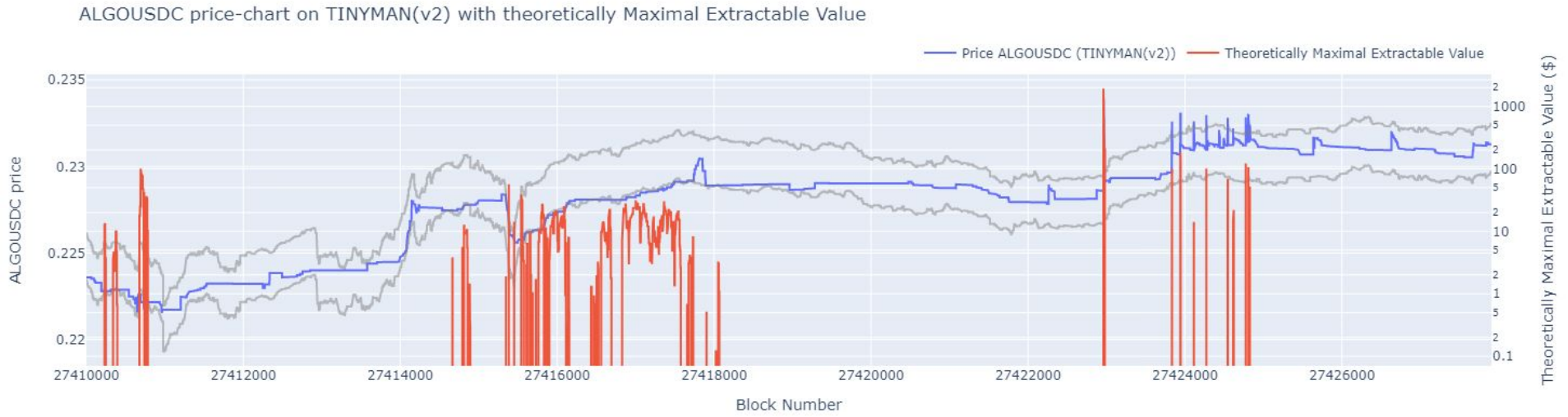

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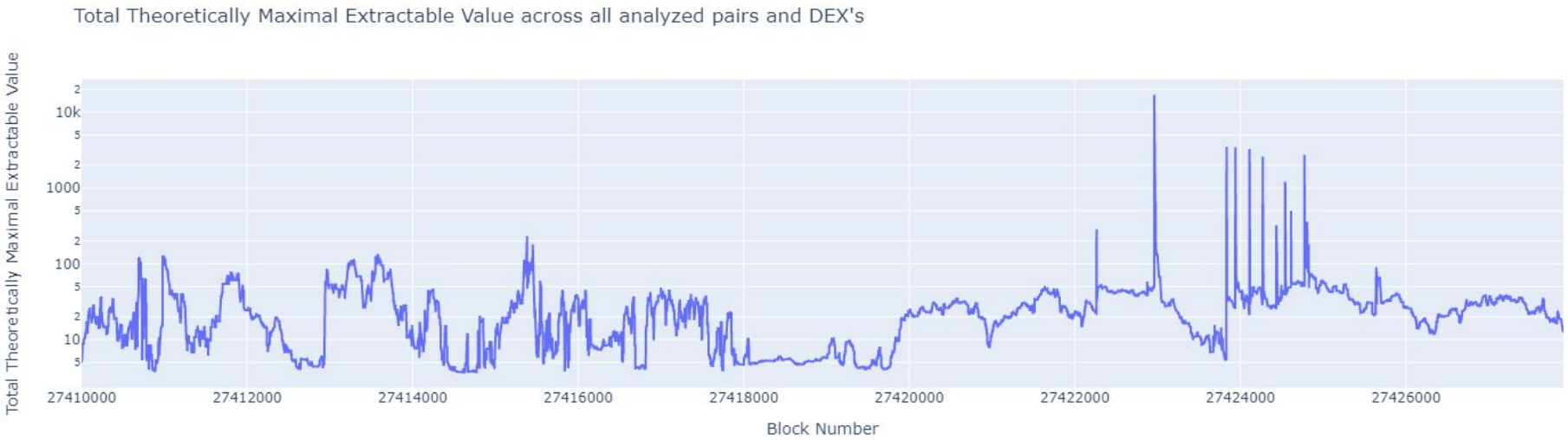

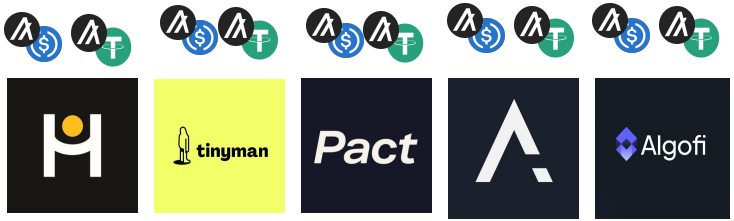

Research Objectives & Results

Identify Potential Opportunities for Profitable cross-DEX Arbitrage Transactions

Algorithm for Lower-Bound cross-DEX Arbitrage Estimate

1. Search for DEX's with theoretical MEV with prices being below deviation boundary
2. Search for DEX's with theoretical MEV with prices being above deviation boundary
3. For each set of DEX's of 1. and 2. select the maxima
4. Perform transactions on both markets using the input of the smaller MEV

Research Objectives & Results

Identify Potential Opportunities for Profitable cross-DEX Arbitrage Transactions

*Example in Block **27424778***

ALGO/goUSD
0.2282$

ALGO/USDC
0.2341$

1. Buy ALGO with goUSD on HumbleSwap using **2,472.06** goUSD for 10,746.32 ALGO
2. Sell 10,746.32 ALGO on HumbleSwap using for **2,505.61** USDC.

Profit of **33.55 USD** (assuming constant stablecoin-prices)

Research Objectives & Results

Analyze Behavior of Market Participants in the Algorand Ecosystem

Dominated by 3 market participant (*doing >95% of all DEX interactions*)

- EVESCVBC6VDIJAZM3HMUGYVQLKWHH4YJBMDV5EF65RMS67TFS5URZQ5YNY
- AACCDJTFPQR5UQJZ337NFR56CC44T776EWBGVJG5NY2QFTQWBWTALTEN4A
- J4BJWP67LHXT7LQTWZYWJGNSB25VZMO6SFZPKBSY7HJUCXJIFVE2PEOTVA

Activity in times of high volatility on CEX's

High likelihood market-making operations or CEX to DEX arbitrage

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Conclusion

Summary

First insights into MEV dynamics on the Algorand blockchain with fixed gas-price dynamics

High number of theoretical arbitrage opportunities across various DEX's

No evidence for systematic cross-DEX related MEV extraction

Limitations

Limited time frame

Limited number of tokens and markets

Relatively simple algorithm for finding profitable cross-DEX arbitrage transactions

Future Work (Application Project)

Extend time periods to generalize

Improve lower-bound estimate of cross-DEX related MEV

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