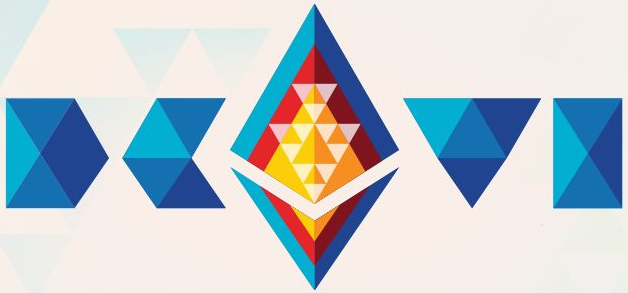


MEV-capturing AMMs

Federico Giacon

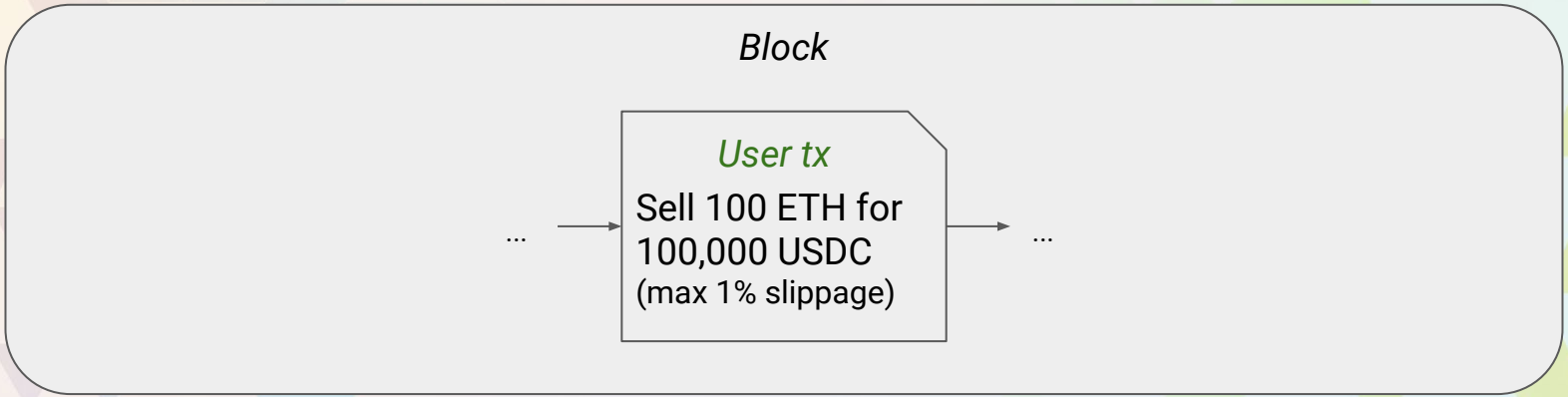
Smart contract developer at CoW Swap

Maximal extractable value (MEV)

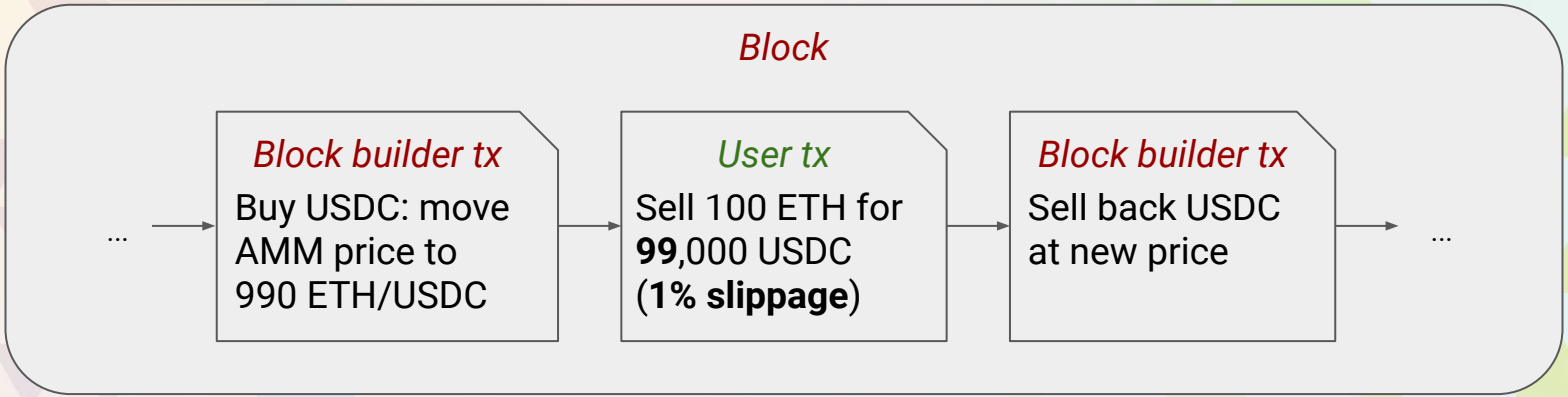
Block builders can **include, exclude, and reorder transactions** in a block.

MEV is the value extracted on top of fees and rewards.

Sandwich attack



Sandwich attack



Loss versus rebalancing

Market	1 ETH = 1400 DAI
AMM	1 ETH → 1400 DAI

Loss versus rebalancing

Market	1 ETH = 1400 DAI
AMM	1 ETH → 1400 DAI

Market	1 ETH = **1300** DAI
AMM	1 ETH → 1400 DAI

Loss versus rebalancing

LVR is an information cost to the liquidity provider: the pool doesn't have access to current market prices.

Market	1 ETH = **1300** DAI
AMM	1 ETH → 1400 DAI

This is **not** impermanent loss!

A concrete example

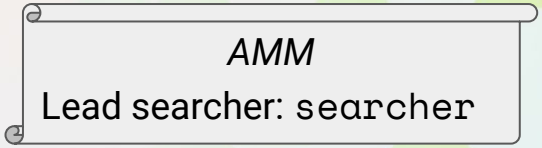
Build an AMM that auctions off the right to the first transaction to the highest bidder (*lead searcher*).

Proceeds go to liquidity providers.

- Lead searcher captures LVR instead of block builders!

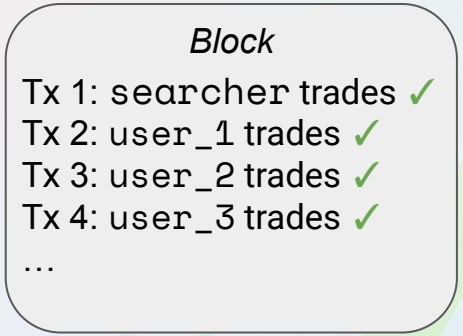
Enforcing first transaction right

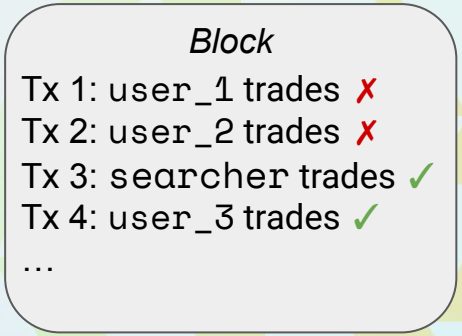
No users can trade until the lead searcher has traded—otherwise the transaction ✗ reverts ✗.



Block builder cooperation needed: the lead searcher transaction is included before any trade.

- Incentive: if the transaction doesn't revert then it uses more gas.





Cost analysis

Estimated MEV **profit** for lead searcher: **+9** $/block

- Based on the value of the first transaction slot on the Eden network

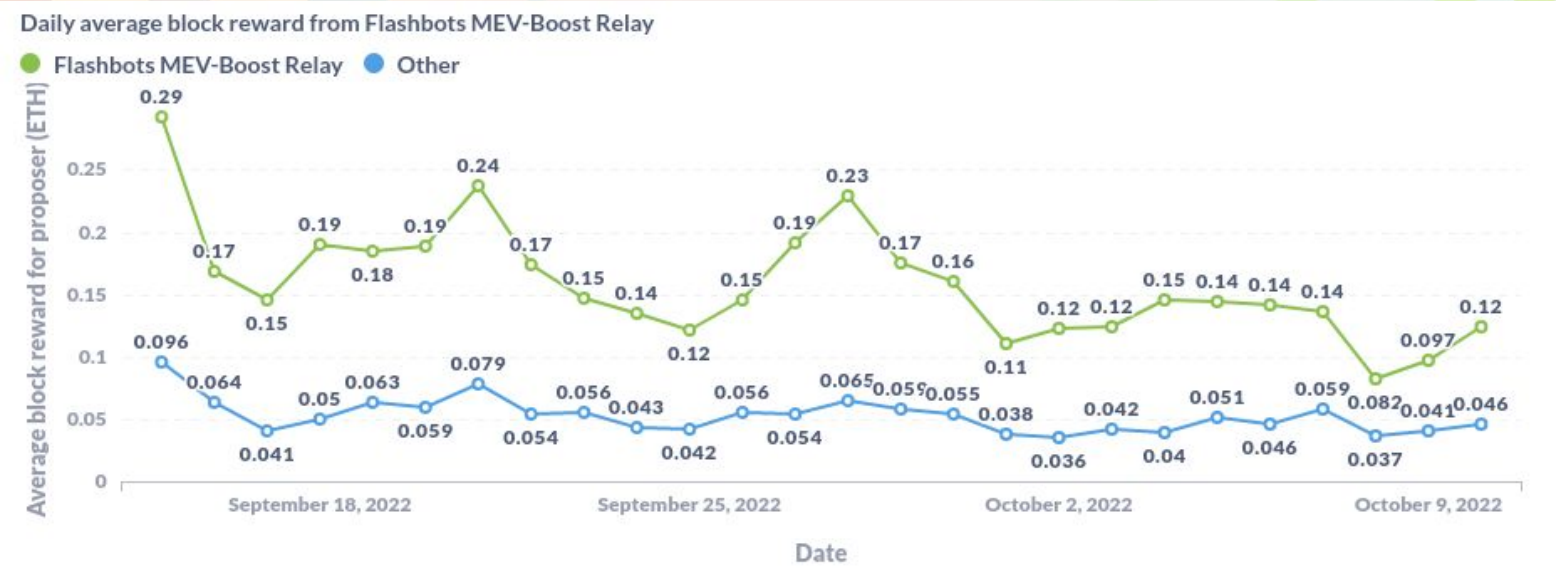
Estimated additional **costs**: **-3** $/block

- From the extra gas cost of enforcing AMM rules *(much lower in L2!)*

Expected **captured MEV** on mainnet: **+6** $/block

Details: https://ethresear.ch/t/mev-capturing-amm-mcamm/13336

MEV extraction potential



Source: https://transparency.flashbots.net

Conclusion

AMMs have hidden fees:

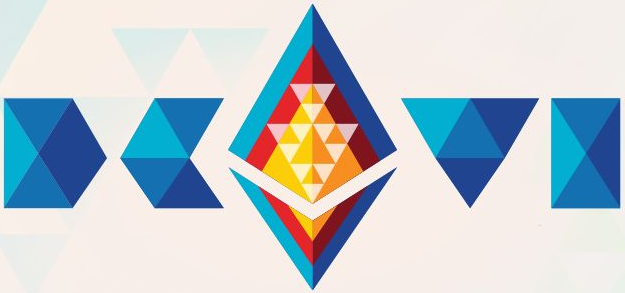
- for users: sandwich attacks
- for liquidity providers: loss versus rebalancing (LVR)

In current AMM designs, these fees are paid to arbitrageurs and block builders.

Goal: efficient AMM designs that distribute these fees away from block builders.

Join the discussion!

https://ethresear.ch/t/mev-capturing-amm-mcamm/13336



Thank you!

Speaker:

Federico Giacon

federico@cow.fi

An idea from:

Alexander Herrmann

alex@cow.fi