Equilibria in DeFi from State Context Inspection

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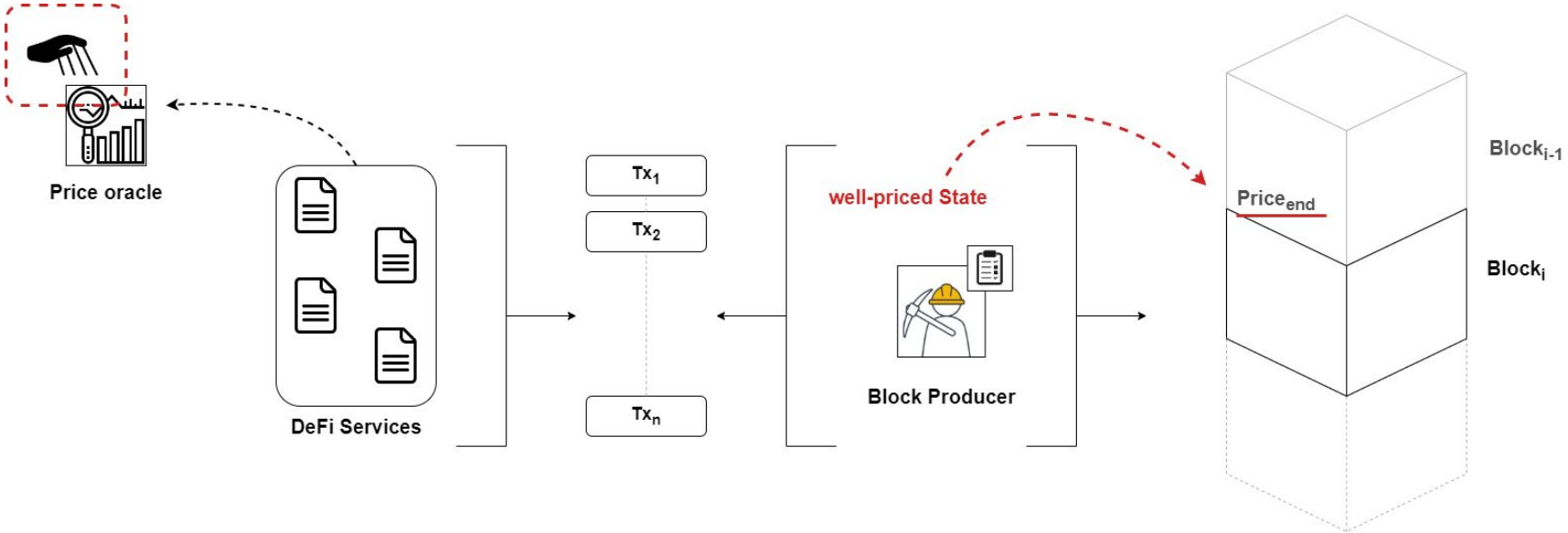
Problem & Goal

Problem: *oracle price manipulations* occur as a result of protocol composition mal-incentives

Goal: Protocols act on *“fair” states*



Oracle Price Manipulation Example

Consider an AMM-based oracle at some price ***P***.

<u>If the oracle price drops 1%</u>:

- Loss: $100 → trade with the AMM (oracle manipulation)
- Profit: $200 → buy the resultant liquidated collateral

Real scenario → Extractable Value

Ideal scenario → Remove Incentives

Solution

$$\mathsf{ctx}\,(\Gamma', \mathsf{liquidate}\,) = \Gamma \xrightarrow{\text{AMM:swap}} \Gamma' \xrightarrow{\text{Coll:liquidate}}$$

context : effect of liquidation protocol on the well-priced state

Solution

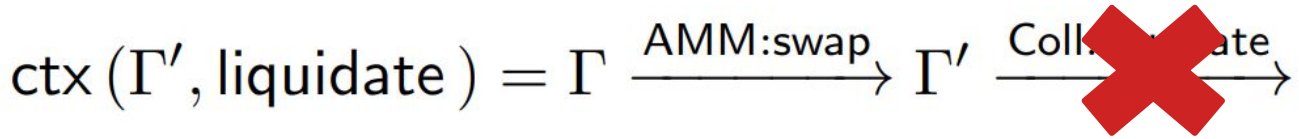
$\mathscr{P}^{\text{ctx}}$

$$\text{ctx}\,(\Gamma', \text{liquidate}\,) \triangleq \Gamma \xrightarrow{\text{AMM:swap}} \Gamma' \xrightarrow{\text{Coll:liquidate}}$$

context : effect of liquidation protocol on the well-priced state

context policy: minimize potential effects of context (maximum permitted distance on AMM price)

Solution



context : effect of liquidation protocol on the well-priced state

context policy: minimize potential effects of context (maximum permitted distance on AMM price)

$$finalPrice_{(ctx\ U\ \mathscr{P}ctx)} = finalPrice_{(noCtx)}$$

Incentive manipulation reduction

Future directions

- Define the context(s) that generate mal-incentives.
- Create a generalized set of policies to minimize these incentives.

- Cost to manipulate oracle is typically fixed,
  - Context mal-incentives increasing in number of composed protocols.
    Can protocols communicate to notify others of their context?
    Introduce an idea of shared *manipulation budget*.

Thank you for your attention!