Blockchain (BlCh)

Swaps and Smart Contract Testing
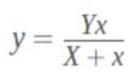
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Liquidity Providing – Lecture 7

- Why is not everybody liquidity providing?

  - Impermanent Loss (its mostly permanent)

    - "Users who provide liquidity to AMMs can see their staked tokens lose value compared to simply holding the tokens on their own."

    - 200 DAI (price 1$), 1 ETH (price 200$) → $40 (10%)

    - ETH price goes up 300$, hodler: 50$ (10%)

    - Arbitration, 1 ETH can be bought for 200$ in this pool and sold for 300$ → provide 45 Dai, get 0.19 ETH

    - Uniswap formula: 245DAI/0.81ETH $49 (10%) - 1$ loss instead hodling

      - The more volatile the market is the higher the impermanent loss

      $$y = \frac{Yx}{X + x}$$

      - Uniswap V3, to reduce the impermanent loss risk, provide liquidity within certain price ranges

    - My previously used formula: Pool: 250DAI/0.8333ETH 50$ (10%) ?

      $$y = \frac{Yx}{X + 2x}$$

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Impermanent Loss

- Always impermanent loss $\quad y = \dfrac{Yx}{X + 2x}$

  - If price remains low impermanent = permanent loss

- Implemented Fondue Swap: https://github.com/tbocek/FondueSwap

  - Swap with no impermanent loss (do not use in production! I'm still investigating)

  - Using the formula where the trade does not leave the pool in a worse state

  - On token sell, seller has to cover the cost of the impermanent loss

  - Added safety net (filled on token buy, and 1% of price difference on token sale)

    - Still, if you drain the pool, you may be paying 10x for selling tokens to cover impermanent loss

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Impermanent Loss – Fondue Swap

- Liquidity in the pool: 2.2m tokens, 11k eth

- Sell token 11m tokens for 4.4k eth, trade at 2474 T/ETH

- Pool is now at price 2200 T/ETH (the above trade has higher price due to the safety net fee, with fee its 2200 T/ETH)

- The pool has now 13m tokens and 6k eth

- Sell token 6m token for 702eth, trade at 8635 T/ETH. now the safety net is empty. More selling will have a much higher price as the full impermanent loss has to be covered

- The pool is now at price 3300 T/ETH, with 19m tokens and 5.8k eth

- Buy tokens 400k for 125 eth at price 3164 T/ETH, filling the safety net again

- Buy tokens 500k for 168 eth at price 2992 T/ETH, filling the safety net again

- Pool has now 17.5 tokens and 5.8 eth

- Sell 7.7m tokens for 369 at price **20988 T/ETH**. Since the safety net did not have many funds, the sell is at a very high price

- Pool is now at 4539 T/ETH, with 26m tokens and 5.7k eth

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Fondue Swap - Testing

- Testing with hardhat, block on tx, can set gas price, etc.

- Creates 10 accounts filled with ETHs

  - Get contract: `SWAP = await ethers.getContractFactory("FondueSwap");`

  - Deploy: `swap = await SWAP.deploy(lp.address); await swap.deployed();`

  - Call: `swap.connect(fromAccount).addLiquidity(...)`
    `swap.addLiquidity(…)`

  - Check balances:
    `const previousTokenBalance = await token.balanceOf(fromAccount.address);`
    `const previousWeiBalance = await fromAccount.getBalance();`

- Run: `npx hardhat test`

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