# Debaseonomics - DaiLpPool

## Security Code Review

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# Overview

### Project Summary

| | |
|---|---|
| **Project Name** | Debaseonomics |
| **Description** | Debaseonomics is a combination of Debase, a flexible supply token, working together with Degov, a governance token working together to solve issues faced by similarly designed tokens. 100% of the tokens are distributed through staking and "stabilizer pools" to promote fairness and decentralization. |
| **Platform** | Ethereum, Solidity |
| **Codebase** | https://github.com/debaseonomics/debase-dai-pool |
| **Commits** | commit 7536a339c7004e487acf96d1409b05b14f1c0f29 |

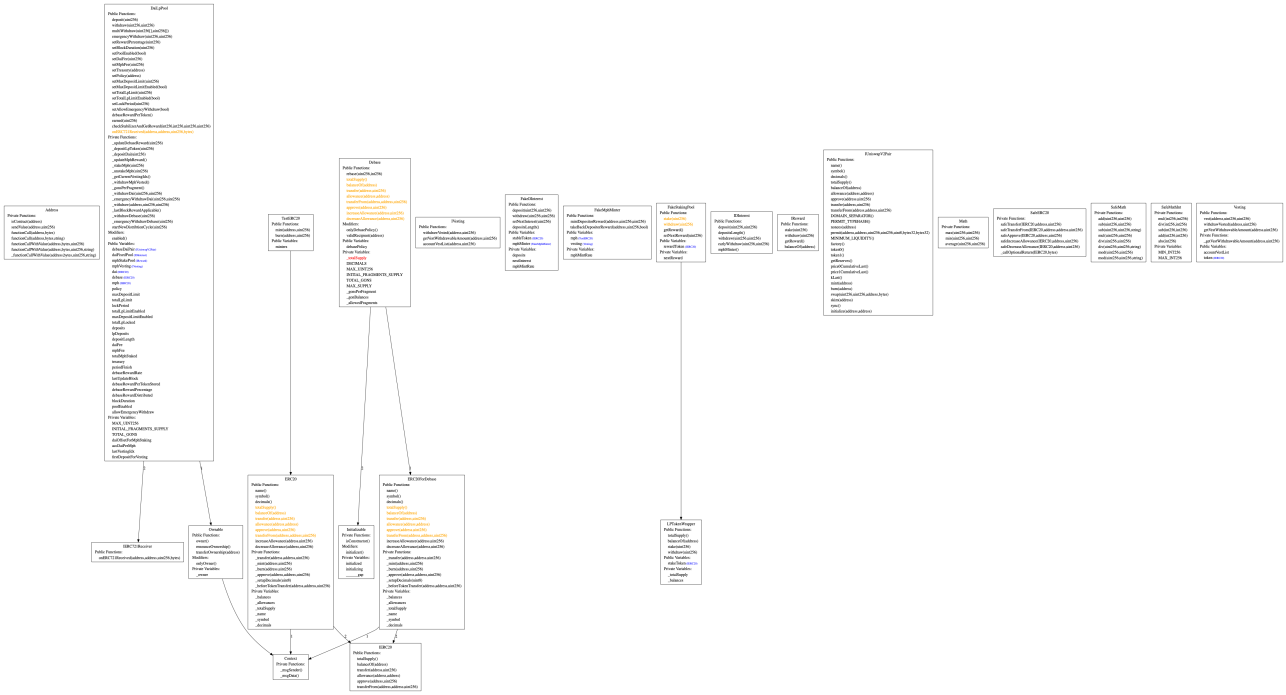
# Executive Summary

The codebase was found well defined, has proper access restrictions where needed, includes very good comments throughout a code. We have run extensive static analysis of the codebase as well as standard security assessment utilising industry approved tools.

We have found no significant issues during our review.

# Architecture & Standards

Architecture of the pool is shown below.



# Findings

Number of contracts: 5 (+ 0 in dependencies, + 0 tests)

Number of assembly lines: 0

Use: Openzeppelin-Ownable, Openzeppelin-SafeMath

| Name | # functions | ERCS | ERC20 info | Complex code | Features |
|---|---|---|---|---|---|
| IVesting | 3 | | | No | AbiEncoderV2 |
| DaiLpPool | 47 | | | No | Send ETH<br>Tokens interaction<br>AbiEncoderV2 |
| IDInterest | 5 | | | No | |
| IReward | 4 | | | No | |
| IUniswapV2Pair | 27 | ERC20 | ∞ Minting<br>Approve Race Cond. | No | |

# Static Analysis Findings

### High issues: None

### Medium issues:

Divide before multiply:

```
DaiLpPool.startNewDistribtionCycle(uint256) (DaiLpPool.sol#498-519) performs a multiplication on the result of a division:
        -debaseRewardRate = poolTotalShare.div(blockDuration) (DaiLpPool.sol#504)
        -leftover = remaining.mul(debaseRewardRate) (DaiLpPool.sol#507)
```

In general, it's usually a good idea to re-arrange arithmetic to perform multiplication before division, unless the limit of a smaller type makes this dangerous.

[Manual Check] It does not possesses significant risks for the contract.

### Low/Informational issues

Uses timestamp for comparisons:

```
DaiLpPool._getCurrentVestingIdx() (DaiLpPool.sol#197-205) uses timestamp for comparisons
        Dangerous comparisons:
        - vest.creationTimestamp < block.timestamp (DaiLpPool.sol#200)
DaiLpPool._withdrawMphVested() (DaiLpPool.sol#207-223) uses timestamp for comparisons
        Dangerous comparisons:
        - block.timestamp >= deposits[depositId].maturationTimestamp (DaiLpPool.sol#216)
DaiLpPool._withdraw(address,uint256,uint256) (DaiLpPool.sol#304-321) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(depositInfo.maturationTimestamp <= block.timestamp,still locked) (DaiLpPool.sol#312)
FakeDInterest.withdraw(uint256,uint256) (mock/FakeDInterest.sol#56-70) uses timestamp for comparisons
        Dangerous comparisons:
        - require(bool,string)(info.maturationTimestamp <= now,DInterest: Deposit not mature) (mock/FakeDInterest.sol#59)
Vesting.withdrawVested(address,uint256) (mock/Vesting.sol#47-65) uses timestamp for comparisons
        Dangerous comparisons:
        - withdrawnAmount == 0 (mock/Vesting.sol#53)
Vesting._getVestWithdrawableAmount(address,uint256) (mock/Vesting.sol#75-100) uses timestamp for comparisons
        Dangerous comparisons:
        - now >= vestCreationTimestamp.add(vestPeriodInSeconds) (mock/Vesting.sol#88)
```

Manual Check] It does not possesses significant risks for the contract as the pool rewards are based on timestamp.

## Dynamic Tests

We have run fuzzing/property-based testing of Ethereum smarts contracts. It was using sophisticated grammar-based fuzzing campaigns based on a contract ABI to falsify user-defined predicates or Solidity assertions.

**We found no high level issues.**

## Manual Check

As this function modified crucial parameters, make sure the contract is deployed with the current governance structure.

# Automatic Tests

We have checked the comprehensive test scripts. They validate the functionality of the contracts. All run successfully.

```
Contract: DaiLpPool basic testing
  Initial settings check
    ✓ Pair token should be debase-dai uni v2 lp (42ms)
    ✓ Dai fixed pool should be 88mph dai fixed pool
    ✓ Mph staking pool should be 88mph staking pool
    ✓ Mph vesting should be 88mph vesting
    ✓ Check dai token
    ✓ Check debase token (38ms)
    ✓ Check mph token (40ms)
    ✓ Policy should be policy contract
    ✓ Max deposit limit should be zero (134ms)
    ✓ Total lp limit should be zero (131ms)
    ✓ Check lock period
    ✓ TotalLpLimitEnabled should be false (138ms)
    ✓ MaxDepositLimitEnabled should be false
    ✓ TotalLpLocked should be zero (253ms)
    ✓ DepositLength should be zero (132ms)
    ✓ Check tresury
    ✓ Check periodFinish (221ms)
    ✓ Check debaseRewardRate (136ms)
    ✓ Check lastUpdateBlock (126ms)
    ✓ Check debaseRewardPerTokenStored (128ms)
    ✓ Check debaseRewardPercentage
    ✓ Check debaseRewardDistributed (127ms)
    ✓ Check blockDuration
    ✓ Check poolEnabled (125ms)
    ✓ Check allowEmergencyWithdraw
  setters check
    ✓ check setRewardPercentage (146ms)
    ✓ check setBlockDuration (185ms)
    ✓ check setPoolEnabled (208ms)
    ✓ check setDaiFee (114ms)
    ✓ check setMphFee (110ms)
    ✓ check setTreasury (159ms)
    ✓ check setPolicy (133ms)
    ✓ check setMaxDepositLimit (98ms)
    ✓ check setMaxDepositLimitEnabled (141ms)
    ✓ check setTotalLpLimit (92ms)
    ✓ check setTotalLpLimitEnabled (141ms)
    ✓ check setMaxDepositLimit (126ms)
    ✓ check setAllowEmergencyWithdraw (137ms)

Contract: DaiLpPool Mainnet testing
  Test limitations
    ✓ enable/disable pools (7079ms)
    ✓ enable/disable total lp limit (238ms)
    ✓ enable/disable total lp limit (249ms)
  Test single deposit
    ✓ Deposit (10765ms)

Contract: DaiLpPool Mainnet testing
  1) "before all" hook: Get contract references for "Check deposit"


42 passing (49s)
```

## Deployment & Contract Ownership

The contracts are not deployed yet.

They should be deployed within current security context including multi-sig wallet and governance structure.

# Disclaimer

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