



TaxHeaven

Smart Contract Security Audit

December, 2020

TechRate

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security. No product code has been reviewed.

Background

TechRate was commissioned by TaxHeaven to perform an audit of smart contracts:

- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/util/TransferETH.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/util/AddressList.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/token/Whitelist.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/token/TaxTokenInterface.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/token/TaxToken.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/oracle/CurrencyConvertOracle.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/oracle/OracleInterface.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/staking/StakingVote.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/staking/StakingInterface.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/staking/StakingDestinations.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/staking/Staking.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/lending/LendingInterface.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/lending/Lending.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/governance/GovernanceInterface.sol>
- <https://github.com/TaxHeaven-loan/TaxHeavenContract/blob/bdb3f2135b19ce59fabd51ce07745095cfb0be2c/contracts/governance/Governance.sol>

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Issues Checking Status

| No. | Issue description. | Checking status |
|-----|--|----------------------|
| 1 | Compiler warnings. | No issues identified |
| 2 | Race conditions and Reentrancy. Cross-function race conditions. | No issues identified |
| 3 | Possible delays in data delivery. | No issues identified |
| 4 | Oracle calls. | No issues identified |
| 5 | Front running. | No issues identified |
| 6 | Timestamp dependence. | No issues identified |
| 7 | Integer Overflow and Underflow. | No issues identified |
| 8 | DoS with Revert. | No issues identified |
| 9 | DoS with block gas limit. | No issues identified |
| 10 | Methods execution permissions. | No issues identified |
| 11 | Economy model. If application logic is based on an incorrect economic model, the application would not function correctly and participants would incur financial losses. This type of issue is most often found in bonus rewards systems, Staking and Farming contracts, Vault and Vesting contracts, etc. | No issues identified |
| 12 | The impact of the exchange rate on the logic. | No issues identified |
| 13 | Private user data leaks. | No issues identified |

Security Issues

High Severity Issues

Smart contract does not contain high severity issues.

Medium Severity Issues

Smart contract does not contain medium severity issues.

Low Severity Issues

1. Zero address checking

Issue:

There is no zero address checking in some functions, for example:

- constructor in [TaxToken.sol#L52](#)
- updateLendingAddress function in [TaxToken.sol#L179](#)
- updateGovernanceAddress function in [TaxToken.sol#L212](#)
- constructor in [StakingVote.sol#L20](#)
- constructor in [Staking.sol#L71](#)
- constructor in [Lending.sol#L33](#)
- constructor in [Governance.sol#L159](#)

Recommendation:

Add zero address checking:

```
require(some_address != address(0));
```

2. Use SafeMath for all math operations

Recommendation:

Use SafeMath library for all math operations for protecting users from integer over- and under- flows. For example:

- mintToken function in [TaxToken.sol#L127](#)
- latestAnswer function in [CurrencyConvertOracle.sol#L45](#)
- latestAnswer function in [CurrencyConvertOracle.sol#L47](#)
- forceLiquidate function in [Lending.sol#L105](#)
- etc.

Conclusion

Smart contracts contain only low severity issues and recommendations and are free of some serious issues which could affect the contracts logic.