

Summary

On Monday, November 20th, an issue was discovered in `DailInterestRateStrategy`

, causing the protocol's assets and liabilities to diverge over time. This difference is the borrow spread above the DSR that Maker was meant to be earning. It is important to note that this issue does not affect end users, and these funds are fully recoverable to the Maker treasury.

Assets and liabilities are defined as such:

`uint256 assets = totalLiquidity + totalDebt; uint256 liabilities = aTokenTotalSupply + accruedToTreasury;`

Root Cause Analysis

Plotting the discrepancy over time revealed that it started after a specific event and has continued increasing (See Figure 1).

After plotting the issue and doing additional checks, the block range was discovered between 18156000 and 18156500 (Sept 17).

[

Figure 1: (assets - liabilities) in DAI market over time

1149×660 31.3 KB

[\[//makerdao-forum-backup.s3.dualstack.us-east-1.amazonaws.com/original/3X/7/c/7ccdc6889e20fae15c5b30aeb0514d7ebca9371a.png\]](https://makerdao-forum-backup.s3.dualstack.us-east-1.amazonaws.com/original/3X/7/c/7ccdc6889e20fae15c5b30aeb0514d7ebca9371a.png)

Figure 1: (assets - liabilities) in DAI market over time

Sept 17 had a governance spell that updated the `DailInterestRateStrategy`

. It was determined that the relevant change in the spell was the update to the `borrowSpread` from 0 to 0.5%.

The issue was discovered in the `DailInterestRateStrategy`

(see Figure 2). Since the `borrowRate`

was converted to be a non-zero value, on line 172, the `variableBorrowRate` is calculated as `baseRate + borrowSpread`

. This value is used to calculate the rate of accrual of debt for all outstanding DAI.

The issue is that `supplyRate`

is calculated on line 180 as `(baseRate + supplySpread) / supplyUtilization`

(`delta == outstandingBorrow`

since `performanceBonus == 0`

. Since `supplySpread == 0`

, the rate that the ATokens are accruing value is less than what it should be in theory which is `(baseRate + borrowSpread) / supplyUtilization`

.

[

Figure 2: function in that contains issue

1036×1205 164 KB

[\[//makerdao-forum-backup.s3.dualstack.us-east-1.amazonaws.com/original/3X/3/3/33ac3f649b1ef5f46707b5cfaec81c223d1fb838.png\]](https://makerdao-forum-backup.s3.dualstack.us-east-1.amazonaws.com/original/3X/3/3/33ac3f649b1ef5f46707b5cfaec81c223d1fb838.png)

Figure 2: `calculateInterestRates`

function in `DailInterestRateStrategy`

that contains issue

Remediation and Improvements

After a conversation, the team decided to split the fix into two parts:

1. Deploy a new `DailInterestRateStrategy`

to halt the discrepancy from further increase.

1. Develop a plan for getting the undercounted funds to Maker treasury.

Phoenix Labs deployed a new instance of the `DailInterestRateStrategy`

with the supply spread and borrow spread set to 0.5%

. There was no immediate danger, so it was agreed to wait for the next regular spell window of Nov 29th. No new code was needed. This spell has now been executed.

Recovering the undercounted assets is more involved, but this can be done anytime since the discrepancy is no longer increasing. This is not a priority since the amount is small.

`DailInterestRateStrategy`

was developed at an earlier time and thus has lots of extra unused features. Unused features create unnecessary complexity which can lead to configuration errors.

Phoenix Labs recommends switching to one of the next-generation IRMs developed in the [SparkLend Advanced](#) repository. In particular, the switch to a `RateTargetBaseInterestRateStrategy`

can be used after the contracts have been finished and audited.

After the spell was executed, the same script used to plot the discrepancy over time was rerun to demonstrate that the amount is no longer increasing at the same rate. It should be noted that there is still a small increase in the discrepancy that will continue to happen, which is the interest being earned on the original ~297k discrepancy amount when it was fixed. This discrepancy extrapolated would increase by another ~3k in two months. Once the accounting is updated in stage 2 of the fix and the assets and liabilities are matching again, this discrepancy will no longer exist and will also no longer increase.

[

Untitled

720×444 28.8 KB

[/makerdao-forum-backup.s3.dualstack.us-east-1.amazonaws.com/original/3X/6/a/6a589eaf2296fea9c5dc194beb0ba514449fd697.png)

Timeline

Date-Time (EST)

Event Description

Notes

2023-11-20 9:30am

Initial discovery & Communication

Phoenix Labs team member notices a large discrepancy between assets and liabilities in the DAI market while building a HealthChecker contract. Over \$214k mismatch in unaccounted-for assets. The rest of the team acknowledges and gains confidence that the issue is real. Further investigation is performed.

2023-11-20 11:00am

Isolation of issue

Phoenix Labs isolates the issue. Root cause analysis is above.

2023-11-20 11:16am

Remediation planning

Phoenix Labs investigates a remediation plan. Details of the plan are above.

2023-11-20 3:25pm

Remediation Strategy Finalized

Phoenix Labs finalizes a remediation plan. Details of the plan are above.

2023-11-21 11:30am

Post Forum Thread

[Thread](#) posted to forum. Gov ops also notified that a Spark Spell should be included in the next executive (Nov 29th).

2023-11-21 12:40pm

Ecosystem Team Approves

Fix has been approved.

2023-11-22 6:21am

Spark Spell Completed

Spark Spell to fix the issue has been sent to the Maker spell crafting team at Maker.

2023-12-04 09:57am

Spell Executes

[Maker Governance - Proposal Stability Scope Parameter Changes, Spark Protocol D3M Parameter Changes, Set Fortunafi Debt Ceiling to Zero DAI, DAO Resolution for HV Bank, Delegate Compensation and Other Actions - September 13, 2023](#)