

Modeling Risk for Twyne Lenders



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About Twyne

(if you're already familiar with how Twyne works, feel free to skip the 'About' section)

Twyne is a universal credit delegation protocol.

Built on existing lending markets like Euler, it allows borrowers to rent unused borrowing power from lenders (Credit LPs) to protect their loan from liquidation. Borrowers pay a small fee to boost their Liquidation LTV (LLTV), while Credit LPs earn extra yield on their idle capital.

For Credit LPs, Twyne is an opportunity to monetize their unused borrow capacity and generate an entirely new income stream. In exchange for extra yield, Credit LPs delegate some of their credit power to back higher-leverage borrowers, leading to a measured increase in risk.

But exactly how much extra risk do Credit LPs take by delegating their borrowing power on Twyne? And is the extra yield they earn enough to compensate for this additional exposure?

These questions are core to how Twyne sets initial vault parameters, including the maximum LLTV attainable by borrowers and the interest rate paid to Credit LPs. In this article, we examine a trove of historical liquidation data to simulate the absolute worst-case scenarios for lenders on Twyne, and ensure a suitable risk-reward model.

The Fallback

For Credit LPs, the main risk in using Twyne comes from the potential losses to their collateral in case of a '**fallback liquidation**'. These are scenarios when Twyne liquidators fail to sanitize the borrower's position on time (for example, due to quick market downturns), leaving the underlying protocol to liquidate the combined position instead. As long as Twyne liquidators act in time, there are **never any losses** to Credit LPs.

To examine what happens during fallback liquidations and calculate the average loss for Credit LPs, we'll use historical data to simulate a **worst-case scenario** where every single liquidation of a Twyne position became a fallback liquidation.

In other words, we'll imagine a world where Twyne liquidators were as inefficient as possible, so that the underlying protocol (Euler) had to step in each time to sanitize the position. This simulation can help us determine **maximum potential losses** for Credit LPs, and set our vault parameters accordingly.

The Methodology

To perform this analysis, we collected 1115 liquidation events that took place on EulerV2 between September 2024 and May 2025, involving ~\$5.4M of collateral assets. For each event, we recorded the collateral used, debt size, liquidation incentive and the closing factor executed by the liquidator.

To show meaningful data, we do not make any distinctions between liquidation events based on the asset pairs involved. Since Twyne will only support bluechip tokens at launch, this analysis should be further considered a worst-case scenario, as it also involves liquidations of less liquid tokens on Euler.

The collected dataset allows us to aggregate the historical performance of liquidators on Euler over several plots and data matrices. Finding just how efficient their liquidators are (or were) is key to understanding how they'd impact Credit LPs on Twyne.

As outlined in the Twyne [\[whitepaper\]](#), two key metrics from Euler liquidators have the biggest impact on potential CLP losses:

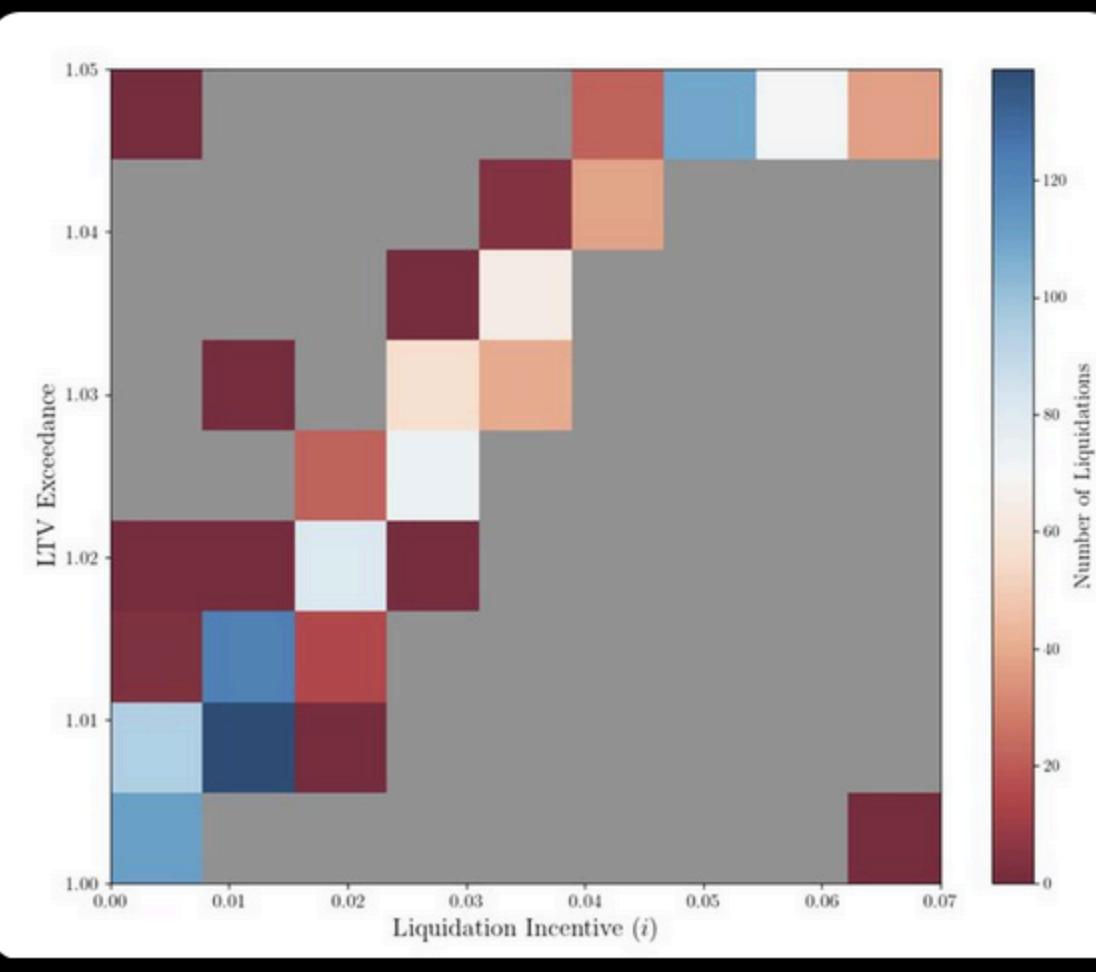
1. Liquidation incentive
2. Closing factor

Credit LPs are most insulated from losses when the underlying lending markets liquidate with **large closing factors** and **low incentives**. So how do Euler liquidators fare in respect to both?

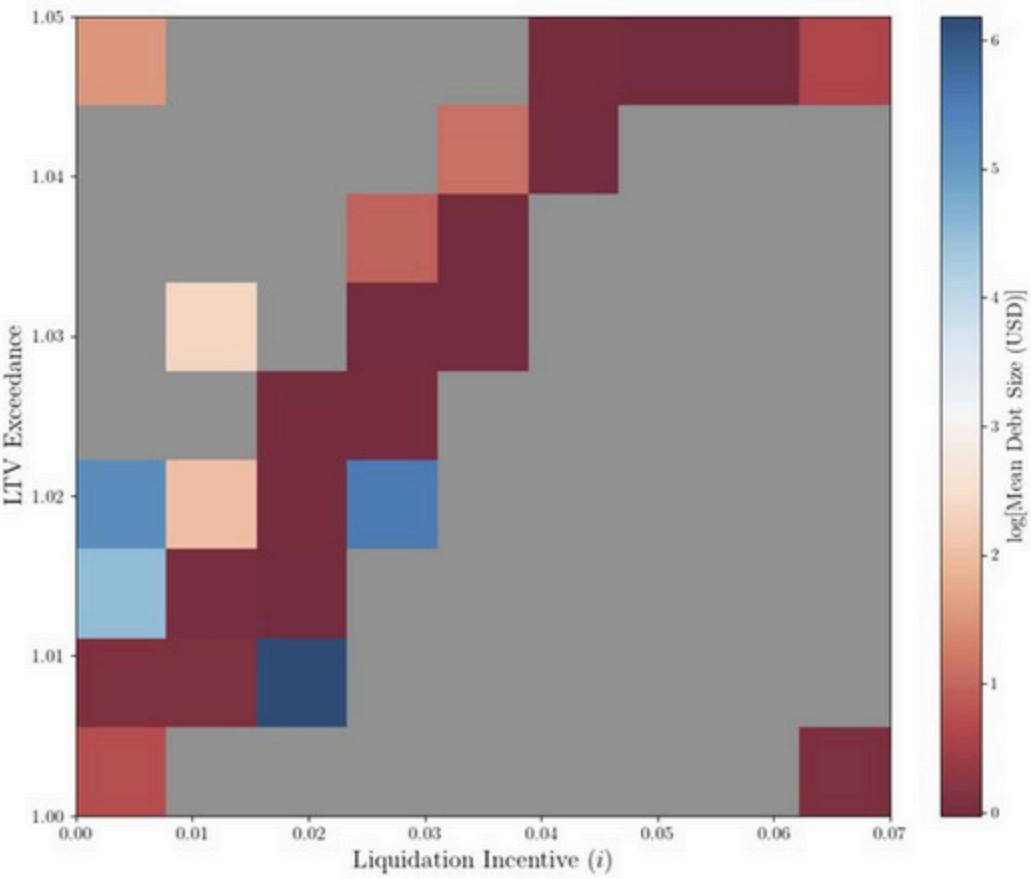
The Liquidators

The first plot shows how much each of the 1115 positions we analyzed exceeded their liquidation LTV (LLTV) threshold at the block in which they were liquidated, versus the liquidation incentive captured by the liquidator. The density plot highlights the linear, dynamic liquidation incentive enforced by EulerV2 on Ethereum mainnet.

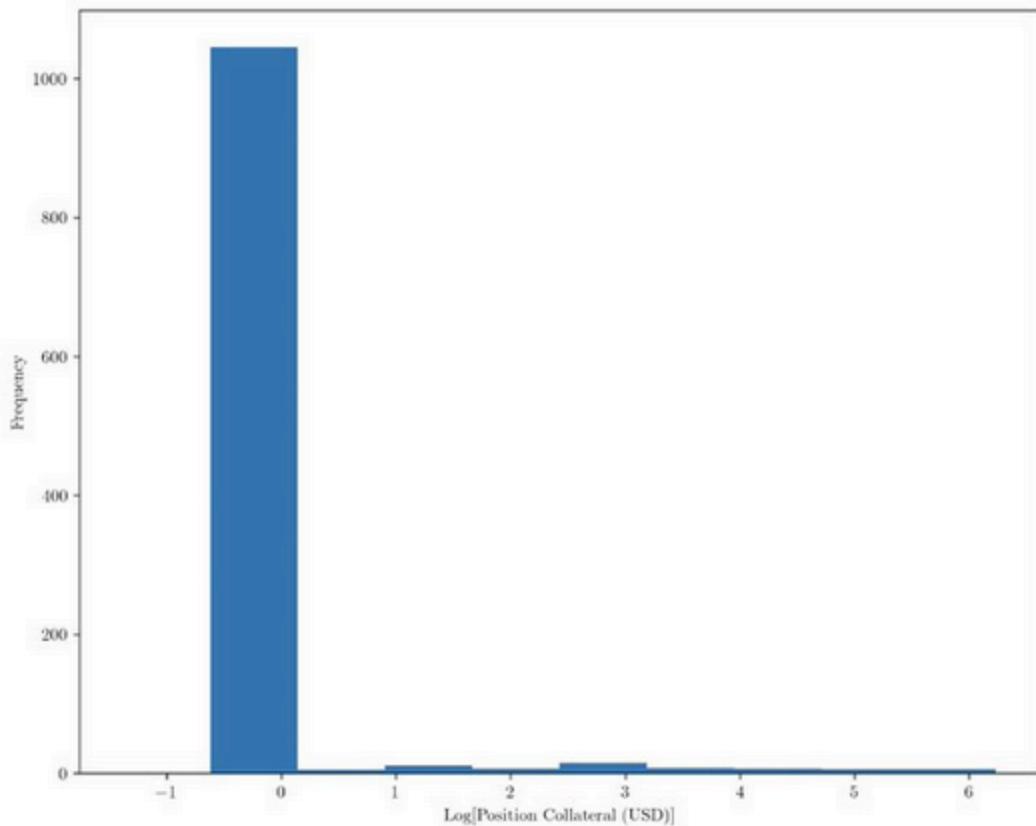
As pictured below, **low liquidation incentives** are evidently more frequent than higher incentives on Euler:



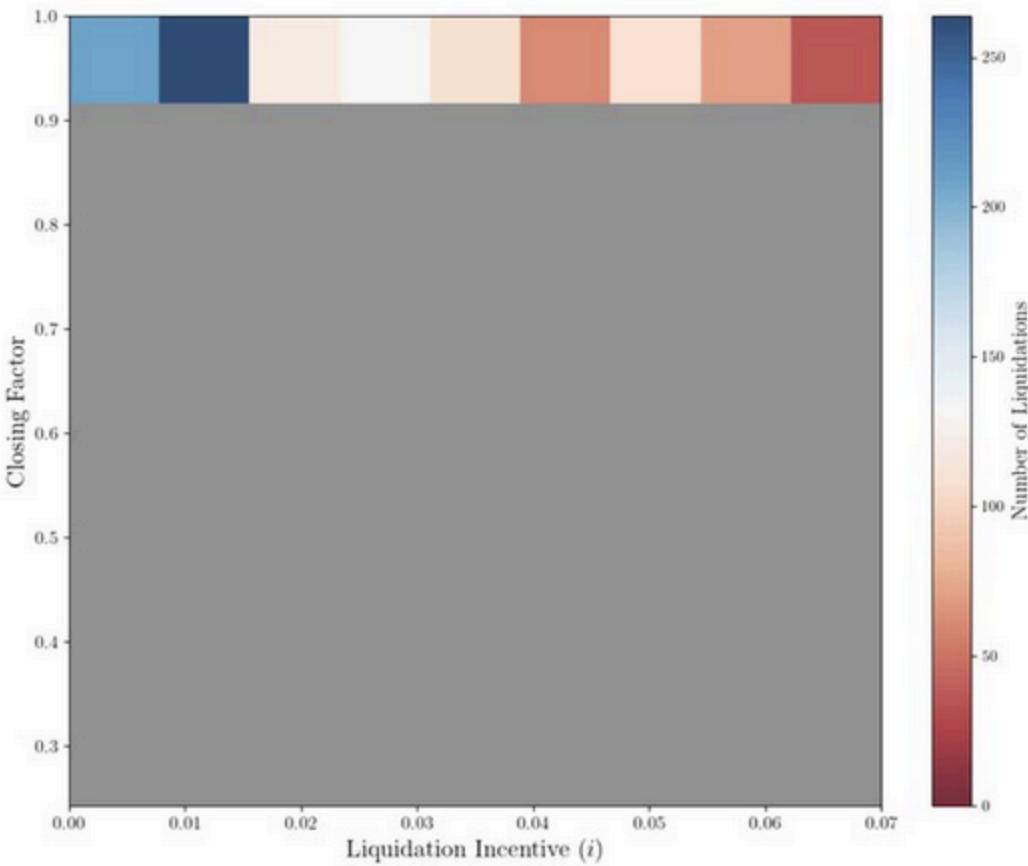
We can also color code this plot according to mean debt size liquidated (expressed logarithmically), to highlight the liquidator efficiency even when dealing with larger debt sizes:



The vast majority of liquidated positions we analyzed were in fact quite small, as seen more directly in the following histogram:



Again, Credit LPs are most protected from potential losses when the underlying market (in this case, Euler) liquidates with **large closing factors and low incentives**. For the collected dataset, the frequency of liquidation incentives and closing factors is shown below:



The plot reveals that it has been **very common** for EulerV2 liquidators to liquidate promptly and with large closing factors in the past. This is a good sign for lenders on Twyne, as it clearly aligns with the most favorable set of conditions for Credit LPs.

The following plot (Figure 9 of the Twyne whitepaper) is an example CLP loss surface for a Twyne deployment on EulerV2, showing how important the low incentive + large closing factor combo is to minimize CLP losses. ([2D Desmos plot](#) for deeper exploration).

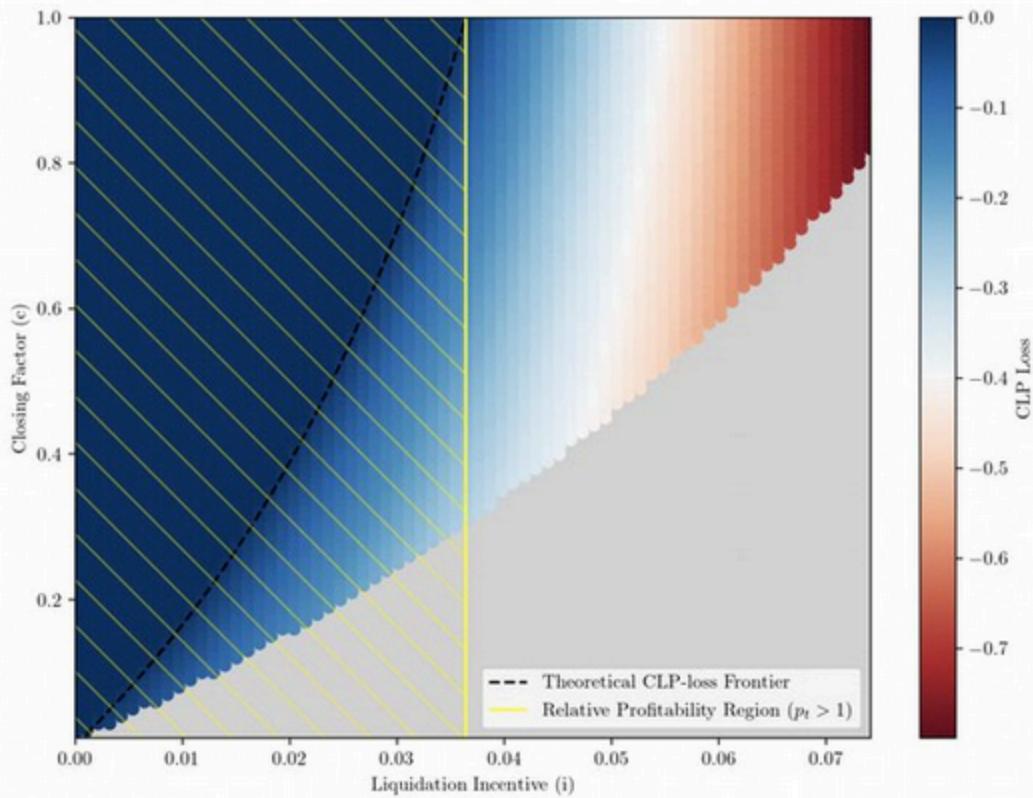


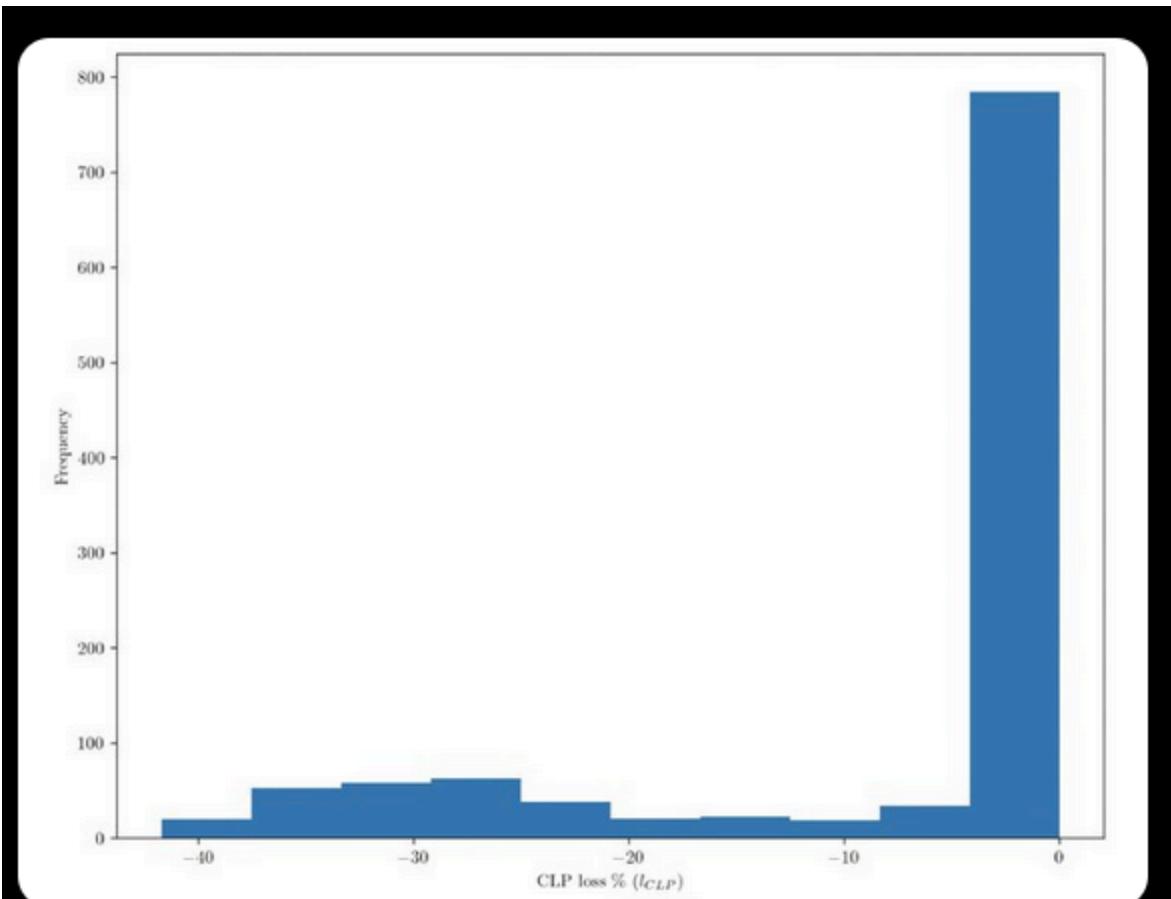
Figure 9: Expected CLP losses as a function of liquidation incentive i and closing factor c with $\tilde{\lambda}_e^{CLP} = \tilde{\lambda}_e^C = 0.85$, $\beta_{safe} = 1.0$, $\tilde{\lambda}_t^{old} = \tilde{\lambda}_t^{max} = 0.931$ for a Twyne deployment on top of Euler V2 on Base. Losses are expressed in decimals ($l_{CLP} = -1 \Leftrightarrow 100\% \text{ loss}$). The loss frontier (black dashed line) corresponds to Equation 38 where $\rho = 1 + i$ has been set to account for Euler's dynamic liquidation incentive mechanism. Similarly we highlight the relative profitability region (yellow thatched) where rational liquidators can be expected to liquidate on Twyne regardless of whether fallback liquidations are available (see Section 8.5 for discussion). Data was generated by constructing arbitrary user positions on the Twyne contracts with $\rho \geq 1$ (to model a position whose liquidation fails to take place on Twyne) and liquidating them through the Euler contracts with varying closing factors such that they become sanitized. Subsequently, Twyne's post-fallback accounting was executed on the Twyne contracts and relevant CLP losses extracted.

Worst-case Scenario

So far, we've determined that Euler liquidators have (historically) sanitized positions in a way that should diminish CLP losses in case there's a fallback liquidation. However, we still don't know what those losses might actually be, especially in a worst-case scenario.

To find out, we can imagine that all of the observed 1115 positions weren't just Euler liquidations, but a result of Twyne's fallback liquidation mechanism. In other words, we could assume that each of these positions was routed through Twyne and eventually became unhealthy. Twyne's internal liquidators then (hypothetically) failed to act each time, leaving Euler to take over. In this scenario, we can attribute a percentage loss that Credit LPs would have experienced for each liquidation event.

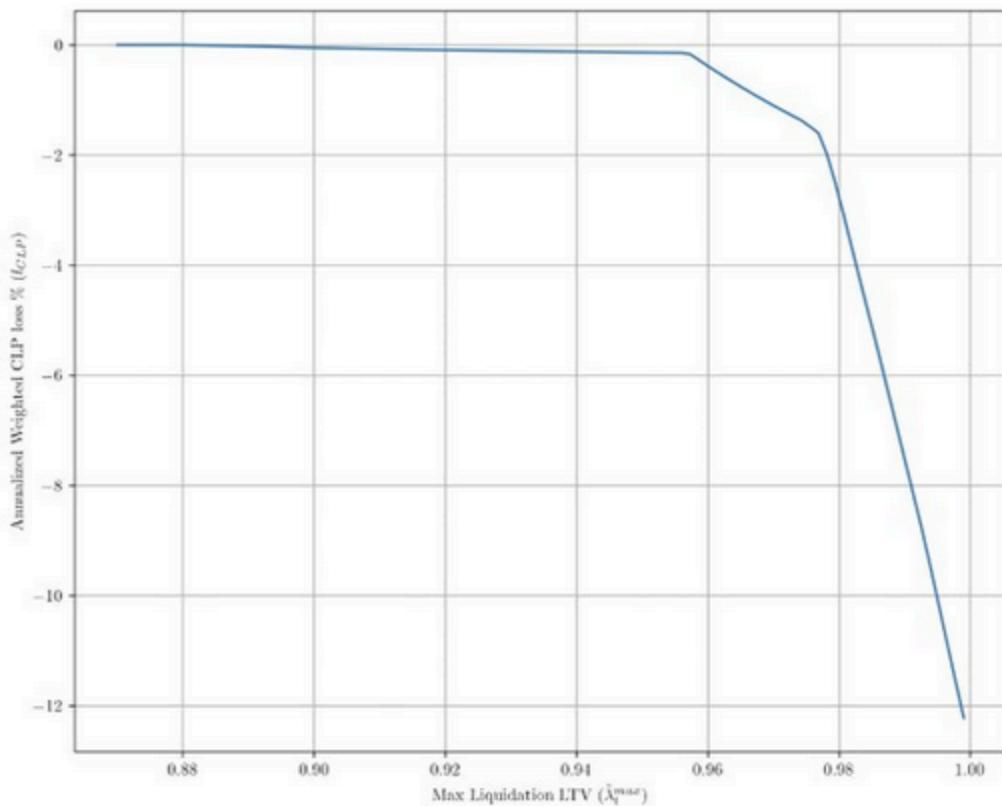
To do this, we also assume that each fallback liquidation involved a Twyne borrower that chose a maximum allowed liquidation LTV on Twyne (`max_liqLTV_twyne`). We can then plot a histogram of such % Credit LP losses (parameter assumption `beta=1`, `liqLTV_euler=0.87`, `max_liqLTV_twyne=0.94`) below:



In this thought exercise, most historical liquidation events would actually lead to **very small or zero losses for Credit LPs**, followed by a longtail of events with progressively harsher loss %.

The tail losses do look intimidating. However, to place these into proper context, it is important to weigh each CLP loss by the credit amount that would have been reserved by the collateral vault being liquidated. This assigns more importance to losses of large borrower positions as opposed to smaller dust positions.

We can also vary the maximum LLTV parameter on Twyne (beta=1, liqLTV_euler=0.87 remain unvaried) to obtain a **curve** of CLP loss percentages at different max liquidation thresholds. This is shown below, where losses have been boosted by 33% to annualize them (weighted_CLP_loss_rate):



Assuming that all liquidations on Twyne were fallback liquidations, raising the maximum LLTV allowed on Twyne directly impacts the annualized CLP losses. It must be re-stressed that this assumption should function as an extreme bound on CLP losses, since internal Twyne liquidations lead to **no losses** at all for CLPs.

The plot above also has the effect of setting a **worst-case APY** that Credit LPs should expect to earn on Twyne, in order to offset any potential losses from fallback liquidations. The Twyne whitepaper introduces the formula to calculate the CLP rate:

$$\text{CLP_rate} = u * \text{IR}(u)$$

where ‘u’ is the utilization rate of the CLPs’ credit, and $\text{IR}(u)$ represents the interest rate model. In a similar vein, annualized CLP *losses* will scale proportionally to the percentage of utilized credit assets:

$$\text{CLP_losses} = u * \text{weighted_CLP_loss_rate}$$

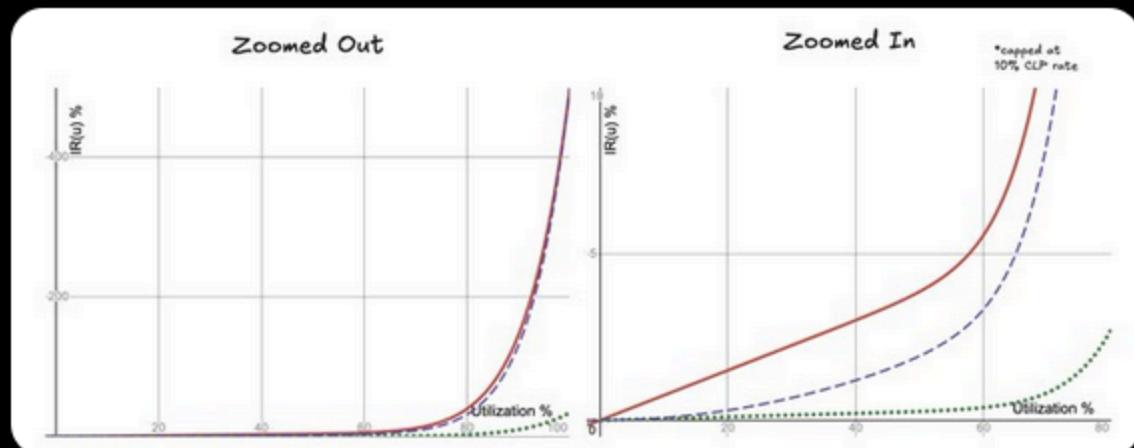
Without going into too much math here, for the CLPs to earn money, it is imperative that the $\text{CLP_rate} > \text{CLP_losses}$. This implies the profit condition:

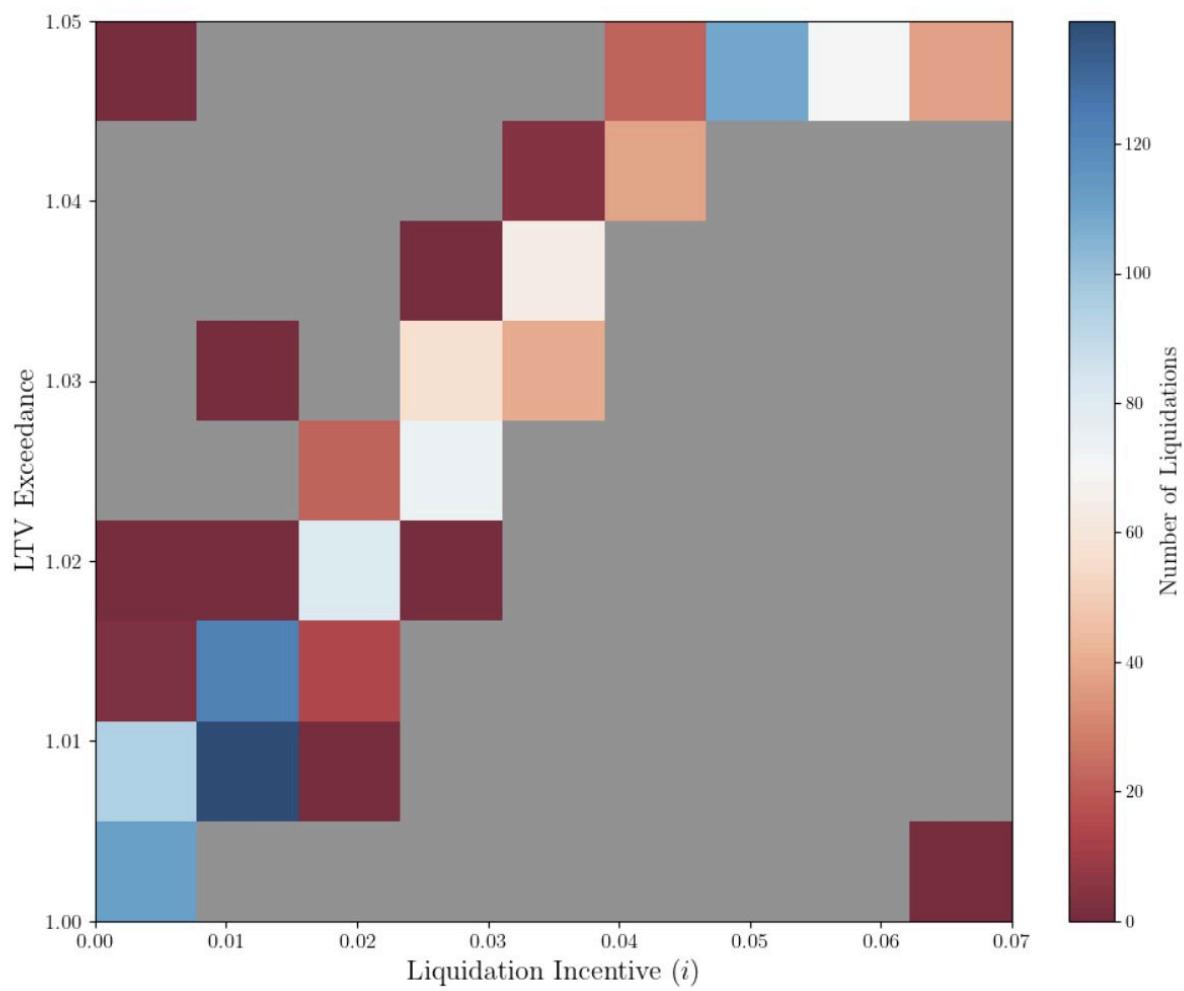
$$\text{IR}(u) > \text{weighted_CLP_loss_rate}$$

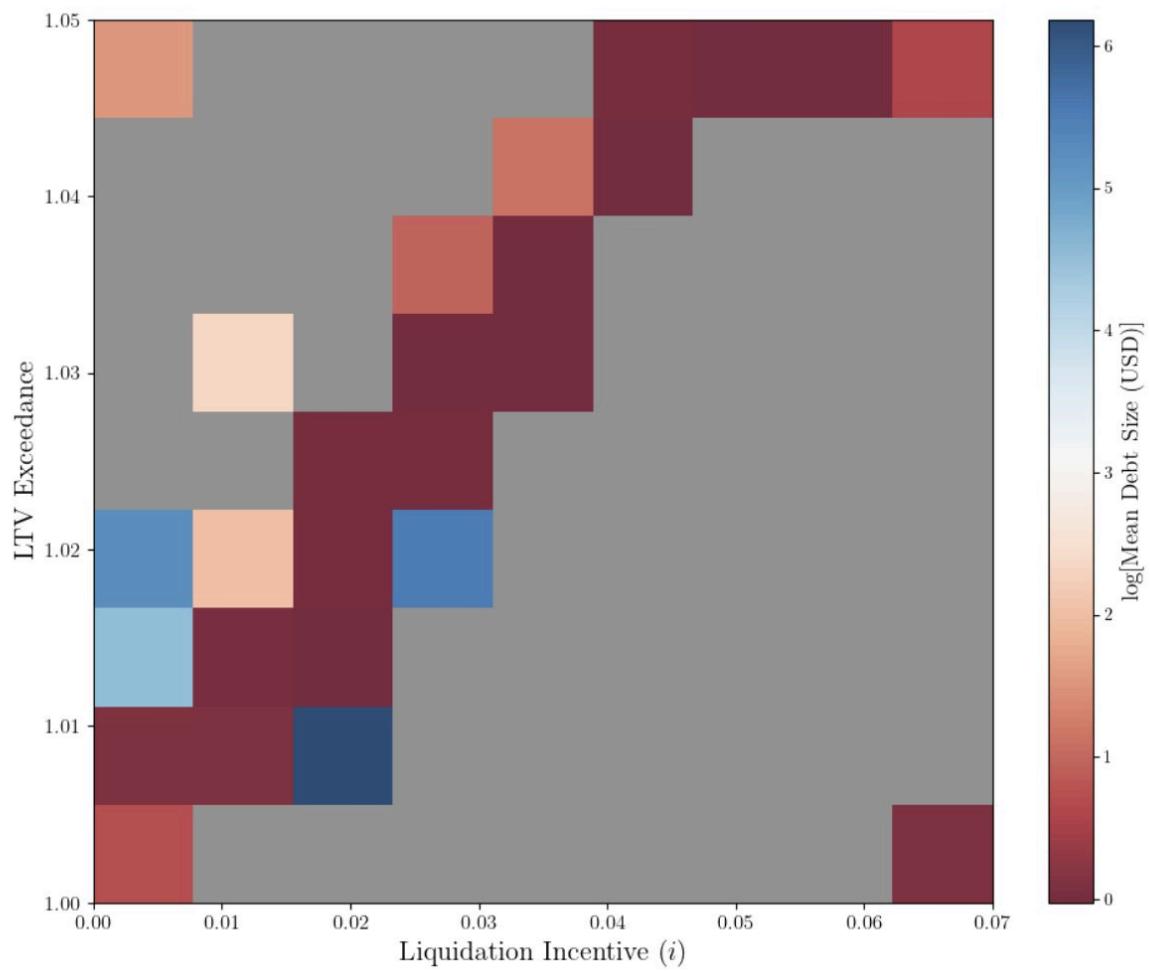
...or, put simply, the interest rate that CLPs earn must be higher than the estimated losses due to fallback liquidations.

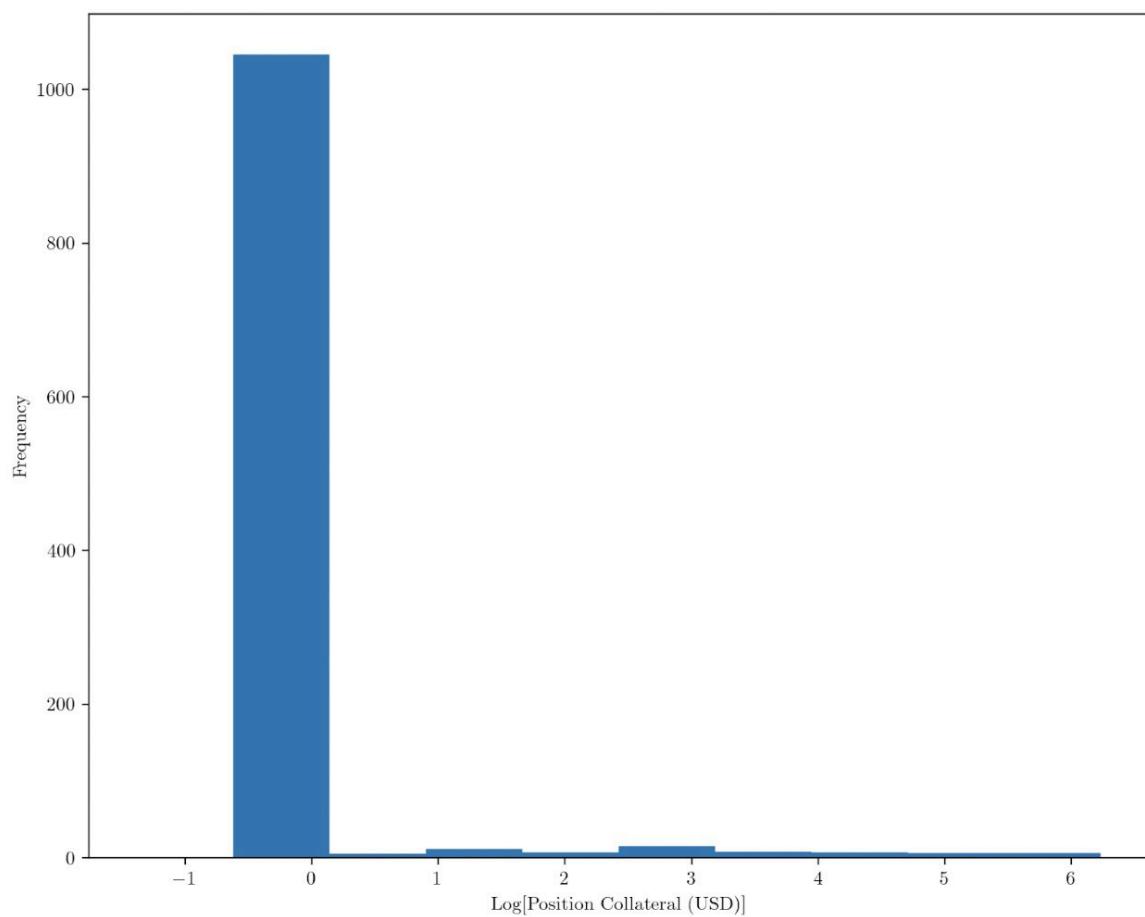
As the above plot shows, at 94% max LLTV on Twyne, the annualized weighted CLP loss rate is 0.16%, and the threshold utilization above which the profit condition holds is 0.3%. **In other words, at just 0.3% credit utilization, CLPs are already earning more than the 0.16% loss estimate.**

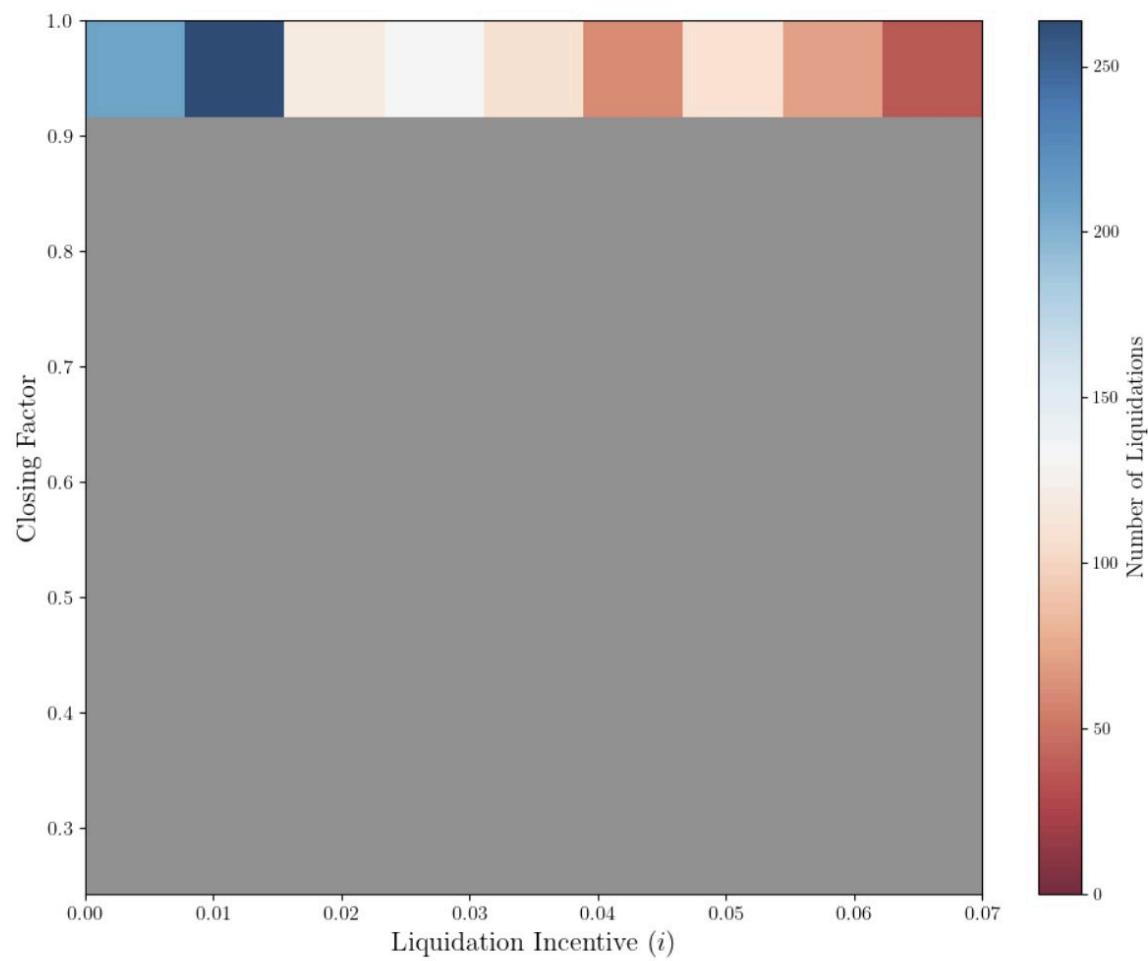
We plot below the interest rate model for the ETH<>Stablecoin vaults on Twyne at public launch, along with a desmos where the interest rate model (red), borrower siphoning rate (dotted green), and CLP credit delegation rate (dashed purple) can be further explored.











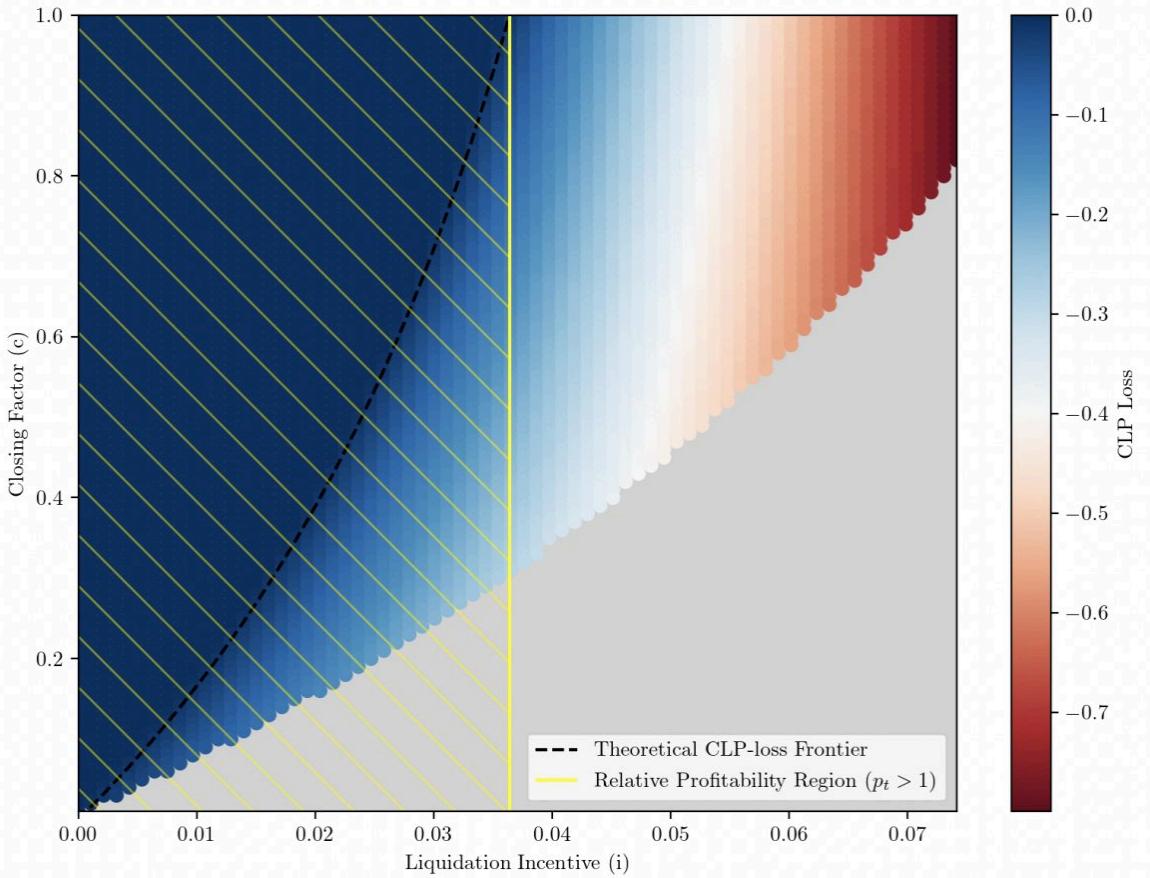


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