The Trinity project

Trinity: A stablecoin and lending protocol backed by decentralized Credit Default swaps

Abstract

Any business or enterprise transaction happens in currency, either in physical or digital mode. We are currently seeing deterioration in value of our transactional currencies leading to reduction in capital efficiency across all the asset classes. Thus, it is necessary that there is a store of value which is relatively volatile but inherently stable. By using the stable coin which is pegged with dollars (transaction currency), we can lend it stability. This stability also comes from the psychological measure of value of people based on our understanding of purchasing power of transactional currencies. In addition, the stable coin will allow the holders to capture the deterioration in purchasing power of transactional currency by adding volatility to the process. This volatility comes in the form of interest rate change and protocol tokens value change which works as a hedge against the loss in value of transactional currency and also captures the upside of the same.

We propose a novel stable coin (Trinity) issued through our lending platform offering a Loan to Value Ratio (LVR) of 100%. Trinity is a combination of decentralized derivative instrument Credit Default Swaps (CDS) for downside protection and collateral options for managing the risks and providing adequate incentives for every stakeholder. Trinity is capital efficient as it is backed by strong counterparties to ensure trust in the system. We have devised unique mechanisms to ensure risk is limited to parties who are looking for outsized or more than usual returns on their investment. Trinity acts as a lending protocol that provides 100 % LVR to users / institutions / brokers . Apart from these, we have devised mechanisms which can manage the risks pertaining to collateral volatility using CDS. The protocol ultimately ensures high capital efficiency of the assets deposited and brings a stable coin to the market which caters to both retail and institutional needs of returns and risk tolerance capacity.

Introduction

Trust is the ultimate currency which drives any human interaction across the world. People trust someone or something if they have a strong backing. Currency as we know today is utilized as the medium of exchange because it has a strong backing by their countries respective governments. Any business or human interaction across the world is run by two layers of trust. The trust in transactional currency and trust in capability to deliver services. Businesses or people pay in currencies like Rupees/Dollars to another business/person in return for the services/effort/goods delivered to each other. Here, trust in currency and trust in another business to deliver the services is what keeps the wheels of the economy chugging along.

Trust is either earned or backed or gut-driven. Our dear currency for which we work very hard is backed by the government. As we know, this currency used to be backed by gold in the early days until finally we developed strong government laws and structures which became the backing for our currency today.

Highly trusted backing ensures that the system will be highly capital efficient. Banks can lend a loan against an illiquid asset like property/real estate or against an intangible asset like an Ivy League college education. This allows to introduce capital efficiency as people can take a loan against their non-cash equivalents or non-liquid assets. Similarly, corporations can issue corporate bonds against their book assets and their credit ratings ensure that the interest charged is reasonable.

We are currently seeing a deterioration in value of our transactional currencies (1) leading to reduction in capital efficiency across all the asset classes. Thus, **It is necessary that there is a store of value which is relatively volatile but inherently stable. The stablecoin is pegged with our transaction currency like dollars/Rupees to lend it stability and psychological measure of value backed by our understanding of purchasing power of transactional currencies. However, the stablecoin also allows the holders to capture the deterioration in purchasing power of transactional currency adding volatility to the process. This volatility works as a hedge against the loss in value of transactional currency** (2)

Our main aim through Project Trinity is to create a stable coin which is highly capital efficient with strong backing by the counterparties to ensure trust in the system is maintained.
We have devised unique mechanisms to ensure risk is limited to parties who are looking for outsized or more than usual returns on their investment.

Project Trinity is the world’s first stable coin and lending platform offering a Loan to Value ratio of 100%. We are also the first protocol utilizing a combination of decentralized derivative instruments like Credit Default swaps and Collateral options to manage the risks and provide adequate incentives for every stakeholder through the use of collateral volatility.

The Project Trinity has broadly 3 core components hence the name Trinity. These are stable coins, Credit default swaps and options. We are also a lending protocol where the stable coins are minted and lent to users who deposit some crypto assets as collateral. However, we are unique in the sense that we enable 100% Loan to Value ratio so users can borrow the stablecoins against the entire value of their collateral. To manage the downside risk of collateral deposited, we have devised a unique mechanism of keeping the collateral value neutral to price variations. This is enabled by taking a short position on the underlying collateral against the long side of trade handled by protocol on behalf of our Credit Default swaps holders. These CDS owners deposit the stablecoins in our CDS contract and their funds are utilized to take a long position on the underlying collateral deposited by borrowers. These CDS owners are compensated with a combination of upfront fees and continuous periodic fees for taking the long side of the position and providing downside protection to collateral assets for borrowers. The borrowers pay these fees to CDS holders in exchange for a downside protection of their collateral and a call option on the underlying collateral asset at some Out of Money strike price. The call option allows them to capture the upside of their collateral. This automatically makes the CDS owners as option sellers also, as they are paid some fixed fees for taking the long side of the trade at some Out of Money strike price.

The protocol ultimately ensures high capital efficiency of the assets deposited and brings a stablecoin which caters to both retail and institutional needs of returns and risk tolerance capacity.

History and Motivation

There was a time of the Free Banking Era when anyone could print their own currency and in which there was no government interference of any kind. The free-banking laws specified that a state banking authority determined the general operating rules and minimum capital requirement, but no official approval was required to start a bank. However, this issued new currency also requires the backing of government bonds. These state bonds at that time were not fully riskless but banknotes issued against the same were at par value of bonds. So, Banks were able to issue a $100 banknote by depositing a state bond with a market value of $90 but par value of $100.) (3)

There has been 3 reasons yet of people minting stablecoins - some citations and references(in paragraph) (What is stablecoins and definitions)

1. They want to stay long in their volatile asset but also not lose out on other opportunities which are coming in this fast growing Defi space. Since, there have been a lot of platforms and yield farms coming out every instant so taking leverage against your capital to take benefit of these other yields is highly enticing. Hence, people borrow stablecoins against their volatile asset to explore other yields in the market (4)

2. Stablecoin as an asset has a wide acceptance across all the new and established platforms. New platforms prefer stablecoins because they do not want their platform to be affected by some external risk factors or broad Defi volatility.(5) Established platforms prefer stablecoins so

that they can diversify their TVL (Total Value locked) to stable assets which will grant backing to their governance tokens or their utility tokens. Stablecoin backing is similar to cash equivalents backing which commands highest trust among the user-base. (6)

3. Users want to take advantage of peg off balance specially when stablecoin value in market is above peg. This way they can borrow stablecoins at 1 USD/Rupee from the protocol and sell it at market price of > 1 USD to make some gains. This is where arbitrageurs come into play which is highly desired by any platform to bring stability.

Our aim through 'Project Trinity' is not to be oblivious of this reality and try to stay close to above core user tendencies as much as possible. We don't want our protocol to just mint some stablecoins by exchanging some volatile crypto just because people want to go riskless. This will make the protocol highly capital inefficient. As we will then be shorting the very asset (ETH or SOL) on which we are building our Defi protocol.

'Project Trinity' will provide an opportunity for users to go riskless but in the process do not lose out on their volatile crypto and always be long on the base layer assets.

Background & related work

Some of the post popular stablecoins in the market are USDT (Tether) and USDC (Circle) and both of them are centralized and backed by Proof of Reserves. A lot of crypto companies pay their employees salaries in USDT and USDC and that is also the preferred option among employees. As the value of the USDT is fully backed by fiat currencies so the peg always remains stable and you will always be redeemed $1 for 1 stablecoin.

Other stablecoins are overcollateralized stablecoins like Maker Dai which has a native blockchain cryptocurrency like ETH or other established projects tokens as their collateral and stable coins are minted at the Loan to Value ratio of 60% or below mostly. These have gained the most adoption due to their overcollateralized nature which makes the protocol less susceptible to default and stablecoin also doesn't lose peg widely. There are interest rate mechanisms put in place to manage the demand and supply of stablecoins in the market which in turn helps in managing the peg of stablecoin to $1. (4)

There are fully algorithmic stablecoins which are fully backed by on-chain algorithms with an algorithmic rule which manage the supply and demand of stablecoins and asset backing them. Both of them can be burned and minted algorithmically to ensure a 1:1 peg. (7)

Then there are partially collateralized and partial algorithmic stablecoins like FRAX.(8) Their collateral consists of established blockchain projects like ETH and protocol tokens in a ratio which varies based on the supply and demand of stablecoins which affects the stablecoin price. If the stablecoin price is above peg then there is higher demand for the stablecoin which can be utilized by protocol to increase the percentage of their own protocol token as backing for the stablecoin minted, leading to adoption of their token widely and increase in price of token. This in turn increases the market capitalization of the project and broader success and strength of protocol.

There are stablecoins which just mints stablecoin in return for supplying native blockchain assets like ETH or established project tokens. These projects have these deposited assets in their balance sheet which are volatile assets. Any change in value of these assets are compensated by minting of protocol tokens which are sold or bought as per the decrease or increase in asset value at a particular discount.

Uptill now there have been depegging in all the 4 scenarios mentioned above with major bank runs in algorithmic stablecoins and partially collateralized stablecoins.The leading examples have been the Terra Luna crash which was based on Algorithmic stablecoin design with the protocol own asset being used as a collateral to back their stablecoin(9). The other big crash has been of Iron Finance stablecoin which was a partially collateralized and partially algorithmic stablecoin.(10) Overcollateralized stablecoins have faced depegging during periods of high collateral volatility which affects the auction of collateral assets at a discounted price. Even centralized stablecoins like USDC backed by Proof of reserves had a depegging of more than 10% due to their reserves being affected in banks which got bankrupt due to bank run. Sometimes, the reserves are being utilized in government bonds or other assets (11) which decreased in value leading to fall in reserves. (12)

Challenges in above stablecoin projects

Existing collateralized lending protocols and algorithmic stablecoins have below issues

1. These protocols have a low capital efficiency — DeFi lenders will require collateral over the value of loan so that if the value of borrowed asset drops or the value of the collateral drops, the lender still has cushion in the form of excess collateral allowing the lender to retain their initial principal. This helps in saving the protocol from insolvency but it also limits the amount of the capital that can be borrowed
2. Protocols need to constantly monitor the market to set an efficient Liquidation discount — Some protocols like Maker and dYdX use an auction mechanism where liquidators bid with increasing amounts of the protocol currency/borrowed asset to liquidate undercollateralized accounts. These bidders will be able to get the collateral at a discount named a LD (Liquidation discount) and then sell the collateral back in the open market at the market price and thus pocketing the profit. However, there occurs slippage in the decentralized exchanges like Uniswap which varies with the Liquidation size. This slippage might lower or eliminate the arbitrage while selling the collateral. Thus, these protocols need to constantly monitor the market and re-evaluate there Liquidation discount (LD) to both ensure overpaying of collateral when the market rate is lower as well as ensure not underpay when the market rate is higher which will lead to no one bidding for Liquidation leading to insolvency risks
3. Algorithmic stablecoins backed by another stablecoin - These stablecoins are majorly backed by a stablecoin asset which doesn't fulfill the need of users to stay long in their

current crypto asset and capture the yields through price appreciation in them.

The Project Trinity will aim to solve these issues and many more.

Problem statements

1. There is a need to create a stable coin which is highly capital efficient with strong backing by the counterparties to ensure trust in the system is maintained.
2. Current stablecoin protocols have not designed good incentive and user-friendly mechanisms for their borrowers. Borrowers have to monitor their collateralization ratios to avoid risk of getting liquidated. This limits the borrowing capacity to a lower Loan to value ratio so that the borrower has some leeway to manage risk of liquidation. This decreases the capital efficiency of the protocol. Although there are projects out their which through some subscription fees provides services of maintaining the collateral ratios but it introduces another overhead on top of the borrowing fees
3. Current Stablecoin do not provide downside protection of borrower's collateral. So, during bearish times, there is a higher risk of collateral liquidation leading to less utilization of these projects leading to less minting of stablecoins which can have a ripple effect on the strength or crypto economics of these projects.
4. Current stablecoin projects have not built a capital efficient way to manage liquidations with incentive structures not attractive enough for liquidators. The best way now is create a readily available pool of stablecoins which will be utilized to manage liquidations at a particular discount. These stablecoins can be utilized in a better way through a robust incentive structure,

Proposed Work - The Trinity Project

Project trinity is focused on creating a stable coin that will work as a competitor to dollar and other currencies across the world. With hyperinflation coming, it is necessary that there is a store of value which is relatively volatile but inherently stable. Also, it is being hypothesized that due to excessive printing of dollars by the Federal reserve in the USA and ending the long term debt cycle could result in excessive depreciation of dollars and loss in its purchasing power. Our stable coin will capture that purchasing power and will work as a hedge against loss in dollar value.

'Project Trinity' is a stablecoin protocol with the aim to provide the best capital efficiency to every participant involved in the protocol.

The project has 3 components as mentioned below

1. Stablecoins - These are issued/minted upon locking of collateral like ETH. The LTV (Loan to Value) ratio will be 100%

2. Decentralized CDS (Credit Default swaps) - The second part of trinity are Credit Default Swaps. Depositors can enter in CDS with the protocol and can get regular funding payments apart from the interest rates which they earn by depositing their stable coins on protocol. Participants can earn more than 100% APY over and above the meager interest rates they receive from just depositing their assets. The CDS owners will also act as can also avail the service of option premiums by which their assets will be readily available in case of default by the borrower. They will be compensated with option premiums in return for the same.

3. Collateral options - The collateral options are the source of fees for CDS owners. The idea behind collateral options is to give an option to the borrower for creating lossless strategies. In traditional finance, people buy options to hedge their downside and create a limited loss strategy. The same ideology will be used here but with the difference that your upside will also be maintained as the collateral options are a form of call options which allows the borrower to earn all the upside above a particular strike price. As the borrower enters into the contract with the protocol and takes loan against Ethereum or any other collateral then simultaneously another contract will get active where upon paying an upfront option price, the borrower can hedge the downside risk.

These 3 will work together to maintain the peg of stable coin, manage collaterals and defaults

The protocol will have a set of 2 types of user-base with different risk tendencies and different opinions about the market.

1. The first type of users will be borrowers who want to mint stablecoins and be also long the volatile crypto asset which they hold. These users also want to achieve the maximum capital efficiency for their deposited capital. To achieve the same, the users will be able to mint and borrow the stablecoins against their deposited capital at the maximum LTV ratio of 100%.
2. The second type of users will be something called Credit Default swap owners. Credit Default Swap (CDS) allows one to swap the credit/default risk in exchange for some periodic fixed fees. In its aim to provide 100% LTV ratio to borrowers, the protocol comes to face the credit/default risk when there is a decrease in deposited capital (collateral) value. Thus protocol will protect itself against these credit risks with the help of CDS owners. The protocol will swap the credit risk from itself to the CDS owners. These users will deposit the stablecoins in CDS contracts. The stablecoins deposited will be acting as a counterpart and their capital will be utilized to counter the credit risk generated on decrease of collateral value. These CDS owners' capital will be locked and in return they will be compensated with a combination of upfront fees and periodic fees which will help them in achieving returns near to 100% APY.

Option Fees exchange among the participants

The fees will be given by borrowers to CDS owners and will be achieved through an options derivative. The protocol will also have a ‘delta neutral contract’ where borrowers' capital and

CDS capital will take a short and long position respectively. This will help in achieving a downside protection on borrowers capital and will also help the protocol to capture an upside of the borrower’s capital and utilize that upside to provide excessive returns to CDS owners and borrowers as well.

For the initial few years, the Protocol parameters will be handled by our core team so as to ensure stablecoin peg is maintained and appropriate incentives are created. We will try to automate most of the parameters over the course of this stabilization period in order to achieve an equilibrium state where the protocol runs smoothly.

Functional Working of the Protocol

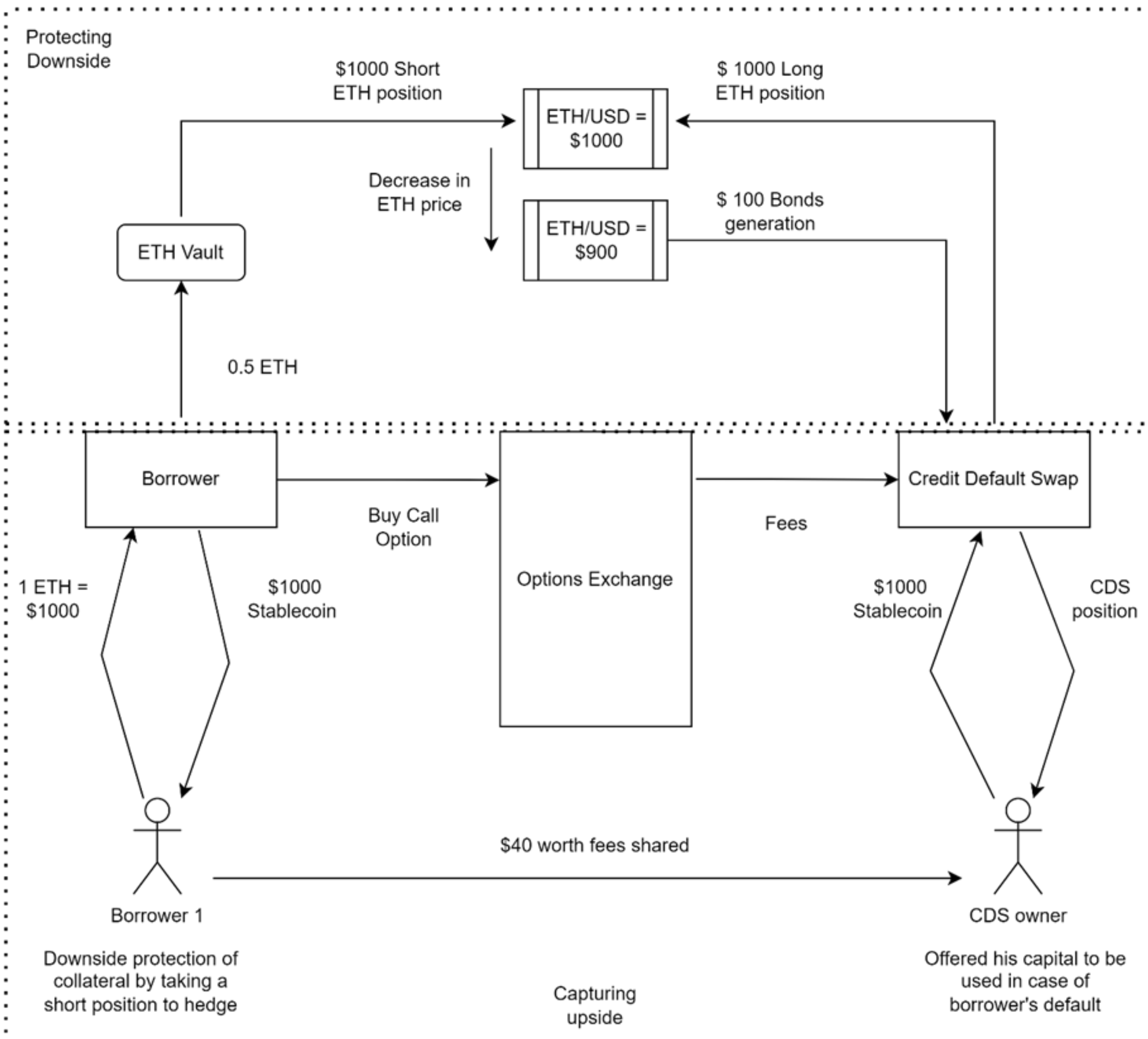


Fig 1: Functional Mechanism of Project Trinity

Stakeholders in Protocol

1. Borrowers – Borrows stable coin by depositing acceptable volatile assets (Ethereum) as Collateral

2. Credit Default Swap owners – Deposits stablecoin which is utilized by system to provide downside protection for the ETH deposited by borrowers

Tokens in Protocol

1. Stablecoin

2. Collateral Options (Contract positions which in the future can be converted to tradable tokens)

3. Hedging/ Protocol tokens (Tokens generated to manage risk and Liquidations in Protocol)

The Borrower borrows stablecoin against collateral deposited. Let's assume the collateral deposited is Ethereum. The Collateral Ethereum is deposited into the Ethereum Vault. On the other side CDS owner deposits stablecoin to be utilized in case of borrower's default.

Protocol now in order to give downside protection of collateral to borrowers will engage in a short position using ETH in the 'ETH vault' on the underlying asset i.e. ETH price. On the other side, Protocol will take CDS stablecoin deposits and put them in a long position on the ETH/USD price.

Now, if the ETH value decreases, the short position will profit by equivalent increase in value. The value is captured by deduction of the same amount from the long position.

Also, If ETH value increases,the long position will profit by an equivalent increase in value after deduction of the same amount from the short position. However, due to the rise in ETH price in ETH vault, it creates a net neutral strategy for short position holders thus offering them downside protection. Thus, we achieve our objective of creating a delta neutral strategy by providing downside protection to borrowers as well as protocol during the decrease in collateral (ETH) price. Now, the borrowers don't have to worry about the confiscation of their collateral due to breach in LTV (Loan to Value) ratios. They also are now able to generate yield during bearish times as their collateral value is not decreasing.

However, by creating this delta neutral strategy, we have also created a limitation in capturing the upside of collateral i.e increase in price of ETH which is very dear to borrowers and one of the big reasons for them not letting go of their collateral. So, we will be solving this issue with the help of a collateral option's mechanism which is detailed later in the document.

The deposits of stablecoin are locked for some duration. Also, the CDS owners will be getting option fees from borrowers in return for offering their stablecoin deposits to offer downside protection from borrowers. Minting of protocol tokens will be done when the collateral value is 90% of the borrowed amount and when the collateral value has touched 80% of the borrowed amount which is the Liquidation territory considering a downside protection of 20% being offered in the initial stages. The protection offered also depends on the average volatility for a fixed duration in the past.

Components of the Protocol

Borrowing of stablecoins

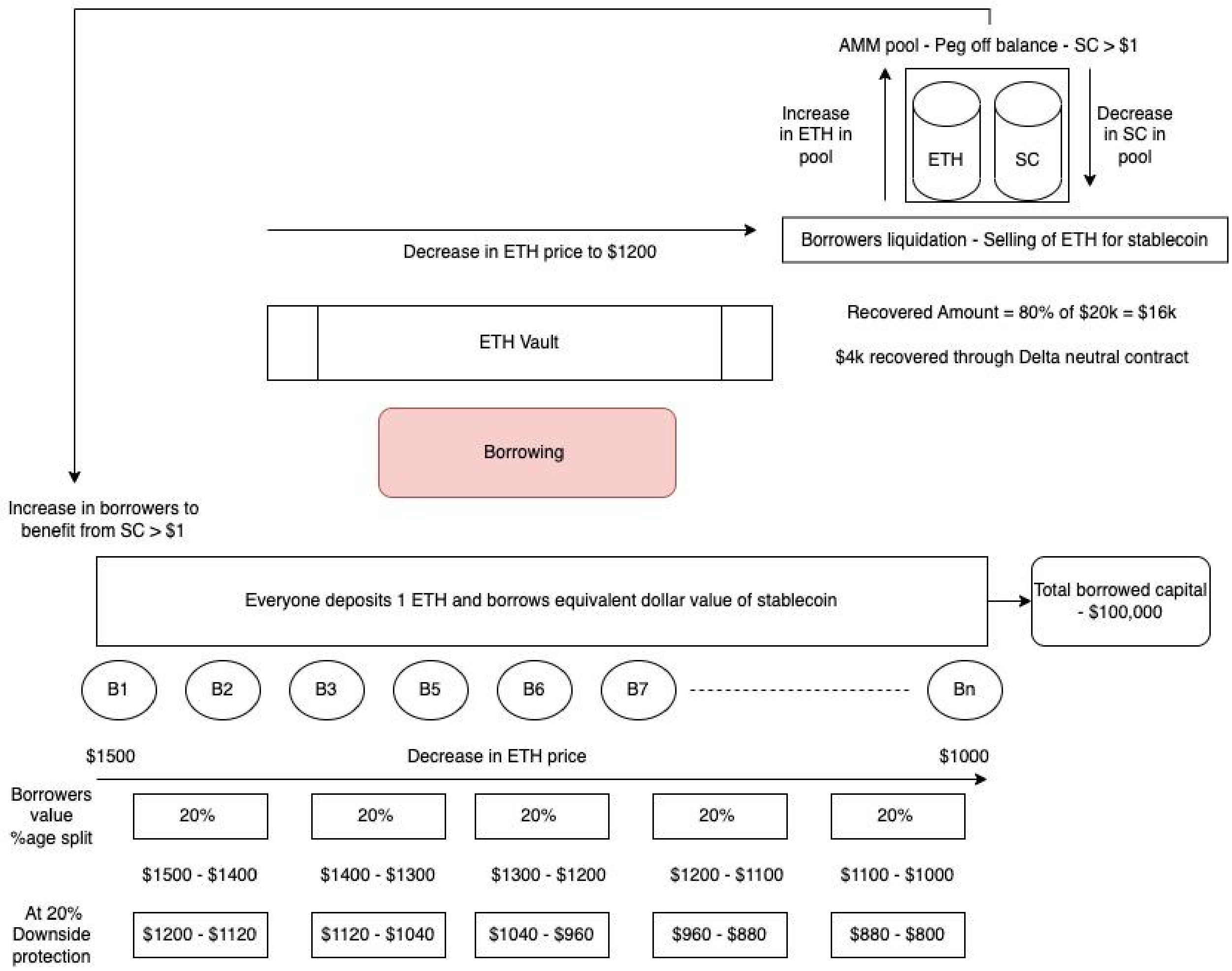


Fig: Borrowing Module

A borrower deposits ETH as collateral and protocol mints equivalent value of stablecoin in 100% Loan to Value ratio.

1. Track the price of ETH at the time of borrowing to store the USD worth of collateral deposited by the borrower. Every borrower will have its USD worth collateral be stored in the smart contract at the time of borrowing.
2. Protocol immediately deposits ETH into the ETH vault and takes a short position on the Delta neutral contract.
3. Protocol mints stablecoin equivalent to USD worth of ETH collateral deposited
4. Total Debt for a particular Vault = Amount borrowed + Borrowing Fees

At t =0, APR = 12% (APR?)

ETH Price = $1000

Collateral Deposited = 1 ETH = $1000

Stablecoin Borrowed, B = $1000

Total Debt at time t = B*(1+APR/n)^t (Describe n &t)

5. Total Debt of Protocol = We don't need to loop across all the individual vaults to calculate the Total Debt by looking at the individual time for every vault since borrowing. Instead, Whenever a new borrower comes to borrow/return the amount then we will just keep on adding and deducting the total borrowed amount. After addition/deduction we will just multiply the amount with the rate for the time since the last borrower came for borrowing/returning the amount.

   So, Total Debt to be returned by borrowers = Toal Vaults Debt * (1+APR/n)^t

   So, no need to loop across all the vaults everytime which can make our contract very complex and time consuming.

Below mentioned are the two scenarios where ETH price increases and decreases to highlight the effect on borrowers, CDS owners and protocol deposits

Borrowers - B1, B2, B3, B4, B5

Borrower's collateral value at different ETH prices - D1, D2, D3, D4, D5

1. ETH price incrementing by 100USD increment

Change in Borrower's positions

ETH Price	1000	1100	1200	1300	1400
Short Position					
Borrower	D1	D2	D3	D4	D5
B1	1000	900	800	700	600
B2		1100	1000	900	700

B3			1200	1100	1000
B4				1300	1200
B5					1400

Change in CDS (Credit Default Swap) holders positions

CDS Pool contains 2 CDS holders deposits - CDS 1 & CDS 2

Long Position					
Pooled CDS positions	D1	D2	D3	D4	D5
CDS pool value	2000	2100	2300	2400	2500
Bonds minted		0	0	0	0

2. ETH price decreasing by 100USD decrement

<u>Change in Borrower's positions</u>

ETH Price	1000	900	800	700	600
Short Position					
Borrower	D1	D2	D3	D4	D5
B1	1000	1100	1200	1300	1400
B2		900	1000	1100	1200

B3			800	900	1000
B4				700	800
B5					600

__Change in CDS (Credit Default Swap) positions__

CDS Pool contains 2 CDS holders deposits - CDS 1 & CDS 2

Long Position					
Pooled CDS positions	D1	D2	D3	D4	D5
CDS pool value	2000	1900	1700	1400	1000
Bonds minted	0	100	200	300	400
Total Bonds minted		100	300	600	1000

Here, Bonds tokens are only minted when the CDS owner tries to unlock his/her position. The position can only be unlocked after a certain time threshold and certain protocol parameters conditions like ratio of Total no. of borrowers to Total no. of CDS owners.

The bond token can also be used simultaneously along with protocol tokens which are minted to manage/diversify the risks and capture the excess volatility in the external prices.

We will be either utilizing a combination of both protocol tokens and bond tokens OR only protocol tokens as per the decision of our team. Both of them have a big utility to play in our contracts for incentivisation and diversifying the risk over longer time horizons.

Credit Default Swap Entry by Holders

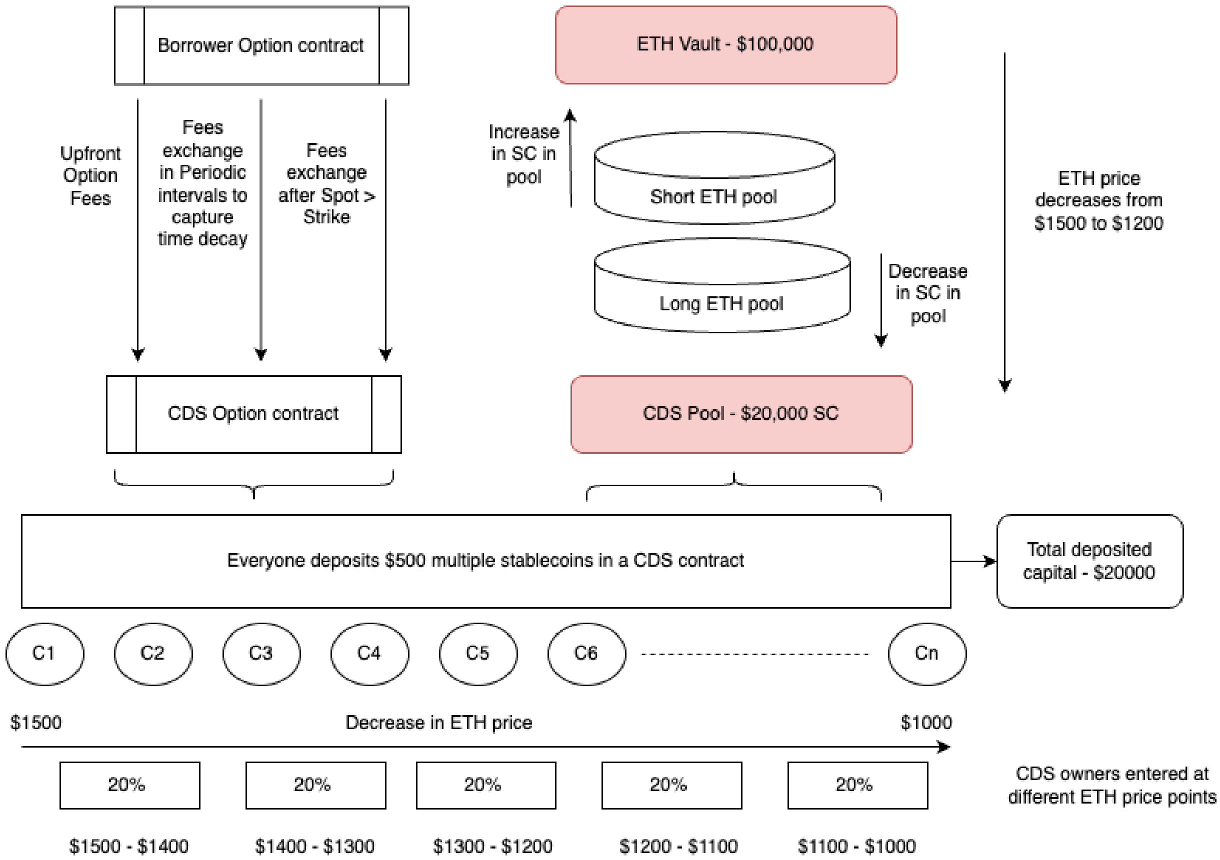


Fig : CDS module

1. Each CDS holder will deposit the Trinity stablecoins after buying from market in the CDS contract in multiples of $500
2. Every CDS holder position will be saved in the contract
3. Total amount will be pooled and a long position is taken on a Delta neutral contract
4. The pooled amount will also be utilized to take an option seller position in an options contract on behalf of CDS holders. This way, the CDS holders will be getting the option fees from borrowers.
5. The unlocking of CDS holder stablecoins will be decided on a combination of fixed term and protocol parameters tracking.

   Ratio of CDS holders/ Ratio of Borrowers >=0.2

Above ratio should be greater than 2 to unlock the CDS positions.

Delta Neutral Contract (Downside Protection for Borrowers)

1. Delta neutral contract is a contract where 2 opposite positions are taken on the price of ETH/USD.
2. One is the short position taken by the borrower's on ETH/USD and other is the long position taken by CDS holder on ETH/USD
3. If the ETH price decreases by 10% then due to the short position taken by the CDS holder, an equivalent USD amount of 10% increase will be added against every ETH in the ETH vault. The same amount will be deducted from CDS long position
4. These are synthetic positions and no cash/physical settlement is happening on every change in price after every periodic interval
5. Cash settlement only happens if a CDS holder wants to withdraw his amount after a lock-in of 1 month duration or other fulfillment of other lock-in conditions envisaged. At that moment, we will calculate the final balance of the total pooled amount. If the amount is positive than the amount pooled then a fraction of the amount will be deducted and given to the CDS holder.

Calculation of balances of long position and short position

1. Short position (Borrowers)

    a. Calculate the quantity of ETH deposited in ETH vault

    b. Track the price of ETH in periodic intervals (1 min)

    c. If the Price of the ETH in current periodic interval is higher/lower than the previous periodic interval, then the total balance of short position will be deducted by below formula

    X = (Total number of ETH in ETH Vault * ETH Price change (Between Periodic intervals)

    Short Position Balance = Total Short Position Balance – (Total number of ETH in ETH Vault * ETH Price change (Between Periodic intervals))

2. Long Position (CDS Holder)

    a. Calculate the total amount of stablecoin deposited in pool

    b. As the price of collateral (ETH) changes, their is a change in the CDS pool long position balance

    Total Long Position Balance = Long position balance in previous interval + X (Real)

Option's contract

The previous iterations being built upon the ERC20 standard, were not able to effectively separate principal and interest while accounting for varying rolling maturities. Previously, these holders would face theta decay as all positions approached maturity at the same time, resulting in a prisoner's dilemma. (14) Time is specified in seconds using unix-timestamps as allowed by Solidity

1. Option contract is designed to provide an avenue for borrowers to capture an upside on ETH price by buying a call option at a particular strike price
2. Option contract also enables the flow of option fees from option buyers i.e. borrowers to Option sellers i.e CDS holders. This help provide an high yield APY to CDS holder who have deposited their amount to be utilized in providing a Delta neutral position to borrowers
3. There are 5 variations of strike prices that can be taken by borrowers – 5%, 10%,15%, 20%, 25%. It implies that borrowers can buy a call option on ETH price on the above percentage ranges for strike prices only
4. The option price will decrease from 5% strike price option to 25% strike price option as per the risks

There are 3 different approaches of designing an option fees exchange mechanism

First Approach

1. There will be only 5 markets for option prices -
    a. Borrowers who bought a call option at 5% strike price will be clubbed together
    b. Borrowers who bought a call option at 10% strike price will be clubbed together
    c. Borrowers who bought a call option at 15% strike price will be clubbed together
    d. Borrowers who bought a call option at 20% strike price will be clubbed together
    e. Borrowers who bought a call option at 25% strike price will be clubbed together
2. Initially we will start with only a 5% strike price option market. So, all borrowers will be entering in a options contract by buying a 5% strike price option
3. Option Price calculation

For a borrower buying a 5% strike price option when ETH price is at $1000 so the strike price is $1050

He pays some Initial Option Fees = 20$

Option Price = Current Option Price * (1+ %change in ETH price from the contract start * 10) - (Time decay affect on Price)

Option Price also changes if some borrower comes in between to sell it's option at the current price. So, that seller will be given the increase in option price by deducting the same amount over the left borrowers who are still holding the option implying they are bullish on the option price and thus acting as a counterparty to the borrower looking to exit from his option contract.

Second Approach

1. Option buyer after engaging in an option contract will be given a NFT depicting his position on 5% strike price. He can then take the NFT and list it in a marketplace to be sold at a particular price.
2. NFT buyers can pay the list price and will be given the NFT which they can deposit at our protocol to get the resulting benefits if the ETH price is above the strike price on an expiry date

Third Approach

Options with no maturity dates and 5 strike price initially

a. Borrowers who bought a call option at 5% strike price will be clubbed together
b. Borrowers who bought a call option at 10% strike price will be clubbed together
c. Borrowers who bought a call option at 15% strike price will be clubbed together
d. Borrowers who bought a call option at 20% strike price will be clubbed together
e. Borrowers who bought a call option at 25% strike price will be clubbed together

Total Option fees = 40% Upfront Payment + Continuous stream of option payments for time decay in option price with no maturity dates

For Instance, ETH spot price = $1000

Borrower deposits 1 ETH as collateral to borrow $1000 stablecoin

Borrower takes a call option at 5% strike price with no expiry of maturity date. So, the strike price is $1050

Total fees = Upfront Option Fees + Continuous stream of option payments to capture theta decay + Option Fees to maintain position (If Spot > Strike)

Total Fees = $10 + $20 (Continuous fees deduction from $20 in 1% percentage points corresponding to theta decay) + (%age Deduction of overall upside as long as the position is kept open)

Risk Management and Protocol Tokens

The protocol is designed in a way so that we can offer downside protection to borrowers on their collaterals and also allow them to capture the upside of collateral. Right now, it's facilitated with a combination of CDS capital (14) and collateral options as incentives.

However, it's necessary that the protocol has enough flexibility to manage risk by providing appropriate incentives for participants in the form of Protocol tokens. These protocol tokens will be minted and burned only based on participant's actions. We understand from Traditional finance on the role of time value of money in providing yields to one party whose assets are utilized by a counterparty to manage the project operations. We are also utilizing CDS owners assets to manage downside risk of collateral in our protocol. In return they are provided with some upfront fees and a continuous flow of fees for time decay in options.

Protocol Tokens will be utilized as a risk management tool for both protocol and CDS owners.

Approach 1

If we look at current decentralized lending markets like Compound Finance then we notice that stablecoins offer a supply APY 20-40X higher than APY on volatile assets like ETH. This yield offered is even higher for tokens with yield farms running. (15)

Thus, when someone deposits Ethereum to borrow stablecoins then he/she has the potential to earn higher yields by utilizing their stablecoins efficiently. Even after deducting borrow fees, the yields offered are higher on stablecoins because of their non-volatile nature.

Our protocol has a downside protection built in through our Delta neutral function. However, our protocol should have flexibility to manage risk through reducing our reliance on collateral assets volatility. By providing incentives through protocol tokens to participants we can diversify risk from collateral assets to protocol tokens. These protocol tokens mint function will get activated when the borrower's collateral has fallen down to 10%. The number of protocol tokens minted will be twice the fall in collateral value. So, if the collateral has fallen down to 10% then the total token minted value should be equal to 20% of collateral value. These minted tokens will be provided to the borrower on returning the stablecoins borrowed. As the provided tokens are double the value of loss in collateral so it acts as an incentive for the borrower to earn an upfront yield. The higher yields which the borrower would have earned by locking or staking their stablecoins on some protocol can be compensated through the upfront tokens earned on returning the borrowed stablecoin.

Thus, the protocol is able to diversify the risk through minting of protocol tokens and using that as incentive for borrowers to timely return their borrowed capital. This also allows the protocol to protect the CDS capital from getting depleted away in the delta neutral function.

The CDS owners are also taking a fair amount of risk in return for outsized returns in form of option fees. The participation of CDS owners is right now solely dependent on their view of the volatility of collateral assets. If the volatility of the collateral asset is small then they will be in a better off position through higher returns from option fees. However, if the volatility of collateral assets is high then their returns have a higher probability of getting hit. Thus, by diversifying the risks from collateral volatility to our protocol tokens, we have a higher flexibility of managing risks in the protocol. The protocol will mint tokens which will be distributed after some term or time duration to CDS owners. This will act as yield on locking of CDS capital for higher durations with the protocol.

How protocol manage against algorithmic risks

1. As the protocol LTV is 100% so some users might try to take the loan in stablecoin to buy ETH and again take the loan against this bought ETH. Users might try to do the same continuously in order to game the system.

   Here, firstly as some fees are deducted from the loan given in stablecoins so the loan value is around 95%. Thus, a scenario of opening borrowing positions repeatedly by utilizing the borrowed SC amount will not be able to affect the system. Ultimately the value is being returned to the system.

   The only systemic risk could be that if all these borrowing positions collateral fell in value then it would affect our CDS pool

Managing Liquidation in Protocol

1. **Method 1**

We have a set of borrowers Br = { b1,b2,b3,b4…………..bn)

Where bi denotes the i-th borrowing position

It is a single collateral lending protocol with stablecoin borrowed in a LTV ratio of 100%

Assuming the collateral utilized is ETH, we have all these borrowers coming at different points of time at different ETH prices and borrowing stablecoin loan at 100% LTV

So, ETH prices corresponding to these set of borrowers can be denoted as

Er = (E1, E2, E3,E4…………….En)

Where Ei denotes the ETH price for the i-th borrowing position

The collateral amount will be a fraction or multiple of ETH value with Ci denoting the collateral deposited by the i-th borrower.

The Debt taken in stablecoin is equivalent to the price of ETH at a LTV of 100%LTV

As the borrower also needs to engage in an option contract along with the borrowing so the borrower needs to pay some option fees which will be utilized for providing downside protection to collateral and capturing ETH upside if the price rises above a particular strike price. We will deduct these fees at the time the borrowing occurs from the Loan value taken by the borrower

These option fees are a combination of upfront fees and fees for taking a perpetual position in the call option. Some of these will be returned after deducting the perpetual call option fees corresponding to the time decay which occurred for the particular borrowing position.The fees will be returned to the borrower in case of an early close of a borrowing position.

The fees will be calculated on the the below factors

1. The fees will have a $10 minimum cap
2. The fees will be dependent on the strike price of the perpetual call option. Fees will be higher for a higher strike price option.
3. Upfront fees will be calculated as per the percentage of downside protection offered to the collateral amount. At the start of the protocol, we will be offering 20% downside protection.

   Upfront fees = 10% * 20%* Ci*Ei

   Perpetual Option Fees

   1. Borrowers who bought a call option at 5% strike price will be clubbed together

      40%* (Strike Price of ETH - Ei)

   2. Borrowers who bought a call option at 10% strike price will be clubbed together

      30%* (Strike Price of ETH - Ei)

3. Borrowers who bought a call option at 15% strike price will be clubbed together

   20%* (Strike Price of ETH - Ei)

4. Borrowers who bought a call option at 20% strike price will be clubbed together

   10%* (Strike Price of ETH - Ei)

5. Borrowers who bought a call option at 25% strike price will be clubbed together

   5%* (Strike Price of ETH - Ei)

The perpetual option fees will have a time decay deduction of fees every day from the perpetual option fees

Time decay = 0.1$ + 10% * (ETH price change every day)

Liquidation management

We manage Liquidation by minting protocol tokens. However that does not mean that we wait for Liquidation to happen and then take action. We will take proactive action to protect the protocol against any Liquidation or strive to earn some yield till the Liquidation happens. This will happen in 2 ways

1. Earning yield from collateral deposited - We will split the collateral value in 2 parts and half of the collateral will be deposited in some other protocol to earn yield and half of the collateral will be kept here to offer downside protection in our See - Saw function
2. Minting of protocol tokens at various stages - Minting of protocol tokens will be done when the collateral value is 90% of the borrowed amount and when the collateral value has touched 80% of the borrowed amount. When the collateral value touches 80% of the borrowed amount then we give them protocol tokens in return for stablecoins. We will apply some Liquidation discount before giving protocol tokens. This mechanism will ensure that we do not have to take our collateral back from an external protocol which might charge us some fees and losing out on yield on the collateral deposited

If D_i is the debt in stablecoin taken by the borrower b_i then at 100% LTV

$D_i = C_i * E_i$

R_t denotes the value of collateral ETH at time t

So, Health of the borrowing position, $H_i = (C_i * R_t) / D_i = (C_i * R_t) / (C_i * E_i) = R_t / E_i$

Health of the borrowing position will mainly vary from 0 to 2 approx. considering that with the rise in value of Hi, the borrower has increased incentive to close his position and take the increase in value.

Protocol tokens will be minted at different stages

1. When Hi approaches 0.9, the protocol tokens will be minted based on below formula

   If market price of protocol tokens = Pm

   Protocol Tokens = [(Ei - Rt) * 2] / Pm

2. When Hi approaches 0.8, the protocol tokens will be minted again

   We will apply a Hypothetical Liquidation discount (U) to come at the value of the protocol tokens minted for Liquidators

   Protocol Tokens = [0.1 * (Ei - Rt)] / Pm

   *Here Hi of 0.9 & 0.8 are dependent on the ETH volatility and CDS volumes/Borrower volumes

Example

Assuming the current market price of ETH, Rt = $1000

The borrower, bi puts 1 ETH as collateral. In return the protocol mints $1000 Trinity SC

So, here Ci is the collateral as a multiple of ETH = 1

Also, Ci*Ei = 1*1000 = $1000

The borrower also chooses the 5% strike price i.e. $1050

So, the option price for borrower = Upfront Option fees + Perpetual option fees

= 0.1*0.2*Ci*Ei + 0.4*(Strike Price - Ei)

= 0.1*0.2*1000 + 0.4*(1050-1000)

= 20 + 20 = $40

So, out of 1000 Trinity SC minted, we will take 40 SC as Option Fees leaving the borrower with 960 SC

Now, Please find below different scenarios

1. ETH fell to $950

   Health of borrowing position, Hi = 0.95

   If borrower decided to come and return $1000 SC then he will get his ETH and $50 SC

   So, in essence, the borrower should be returned only $950 SC and will get his ETH back

   CDS

2. ETH fell to $900

   So, here Hi = 0.90

   Let's, Protocol tokens, Pm = $2

   The protocol will mint Protocol tokens = [(Ei - Rt) * 2] / Pm

   = [(1000 - 900) * 2]/ 2

   = 100 Protocol tokens

   Here, if the borrower decided to come and return $1000 SC then he will get his ETH back after a 3 month time period but he will get 100 Protocol tokens immediately.

   In essence, the borrower should return only $900 SC and he will get his 100 Protocol tokens

3. ETH fell to $850

   Here Hi = 0.85

   Here, if the borrower decided to come and return $1000 SC then he will get his ETH back after a 3 month time period but he will get those earlier minted 100 Protocol tokens.

   In essence, the borrower should return only $850 SC and he will get his 100 Protocol tokens

4. ETH fell to $800

   Here, Hi = 0.8

   Here, the borrower collateral assets will now become protocol assets. So, Protocol will become the owner of ETH.

The earlier 100 protocol tokens + 10% more Protocol tokens will be given to Liquidator who will give 200 SC to protocol in return for Protocol tokens

So, Liquidator will get = [0.1 * (Ei - Rt)] / Pm

= 100 + 0.1* (1000 - 800)/2

= 100 + 10 = 110 Protocol tokens

Liquidator will get = 1.1 * [(Ei - Rt) / Pm] it will be a direct call from the user (depositor of that particular index cannot be a Liquidator/user).

Calculation of Final Accrued value to open CDS position

We should be able to know the total amount to be returned to the CDS depositor after a particular time period.

So, the process of calculation of the exchange of funds between ETH pool and CDS pool will be done after every CDS action or borrower action

As soon as a CDS deposits some funds into our platform, then we will identify

- Current ETH market price, Er
- Amount of CDS funds deposited/Total CDS deposited funds till now (Cd/C)
- Total number of ETH holdings in our ETH pool

We will then calculate the current value of CDS funds in our protocol

Total CDS Deposited Funds = C

CDS deposited funds = Cd

CDS current funds = Cr1

So, Cr = Cd + (Cd/C)*(Er - Ei)*(Total Eth Holdings)

We will calculate the division of exchanged funds among the total CDS depositors through the above formula. As soon as there is a new depositor or new borrower or any sort of new event which takes place then the value of different figures in the formula will change. This will then change the division percentage of exchanged funds after the new event.

Thus, Cr2 = Cd + (Cd/C)*(E_r- E_{i+1}) * (Total ETH Holdings)

Please find the below scenario for easy understanding

Day	Total ETH	Initial ETH capital	ETH price	Initial CDS amount	CDS Pool	CDS depositors	Total	Net value of CDS Pool
1	51	50000	1000	10000		1000	11000	11000
2	52		1010		510	1000	12000	12510
3	53		1020		1030	1000	13000	14030
4	54		1030		1560	1000	14000	15560
5	55		1040		2100	1000	15000	17100
6	56		1030		1550	1000	16000	17550
7	57		1020		990	1000	17000	17990
8	58		1010		420	1000	18000	18420
9	59		1000		-160	1000	19000	18840
10	60		950		-3110	1000	20000	16890

	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
CDS 1	1046.4	1043.3							
CDS 2		1043.3							
CDS 3			1040.8						
CDS 4				1038.6					
CDS 5					963.3				
CDS 6						965.0			
CDS 7							966.5		
CDS 8								967.8	
CDS 9									844.7

So, after every event, the reward percentage split changes which requires us to calculate the split of rewards between 2 deposit intervals among all the CDS depositors till that moment. This exercise will be too computationally intensive for the smart contract considering there might be 100s of thousands of CDS depositors. Also, calculating the reward split before every new CDS deposit would delay the transaction completion time and considerably affect the user experience.

In order to manage the above situation, we will be maintaining a record of reward split for only 1 standardized deposit amount. For the start, we have considered that deposit amount to be $1000. So, before every new CDS deposit transaction, we will calculate the proportionate reward for $1000 worth of deposits and keep on updating the total amount after every transaction. This will allow us to calculate the final amount to be given back to CDS when he/she tries to close the CDS position. The total amount for the particular CDS will be a fraction/multiple of the current total amount of the standard $1000 deposit figure.

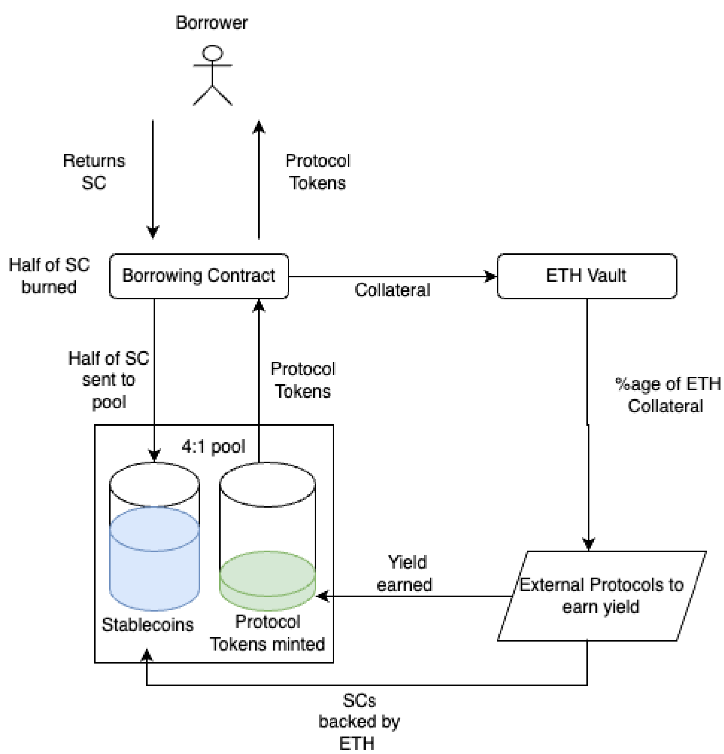
Thus, we have been able to identify the value accrued to a CDS position during the time of withdrawal which is one of the critical values to calculate from the operation of our See - Saw contract.

Utilization of Protocol Tokens as Reserve currency

As we intend to offer 20% downside protection on collateral deposited by borrowers so we will be potentially dealing with a situation where users won't be returning the loan amount until & unless their collateral is near 80% of the value deposited while opening a borrowing position. This is a probable situation because users will try to take the maximum benefit of downside protection offered.

As most of the time the collateral volatility varies between 20% so CDS capital will be protected most of the time. If and when the borrower comes to return the stablecoins back then the returned amount will be the current value of collateral. Thus, the borrower doesn' need to return the whole borrowed amount and instead just give the less amount equivalent to the current value of collateral. This ensures that stablecoins confiscated from CDS capital remain with the protocol and never really leave the system.

A simultaneous operation of minting protocol tokens will happen and those will be given back to the borrower. So what really happens is that we will be maintaining a pool of stablecoins and protocol tokens and half of the returned stablecoin will be burned and another half will be deposited in the pool which will be backing the protocol tokens minted from the pool.



An alternate less risky protocol design of Project Trinity

A robust mechanism can be built if we take a current view of daily volatility of collateral price and based on that build a normal distribution graph. We will observe that the volatility varies between some limits and outside that limits are outlier events.

Assuming that ETH volatility varies usually around 20% so we can offer ETH downside protection beyond the 20% fall in ETH price. This helps build a robust mechanism where we will only be confiscating CDS capital when the collateral value falls below 20% of the value at deposit time. Thus our Credit default swaps module will work to swap credit risk beyond 80% fall in collateral value from CDS depositors to borrowers and Protocol.

Here, we will be offering the Loan to Value (LTV) ratio of 80% with the protection offered for 80% of the collateral amount in return for option fees which the borrowers are paying. Also, when the collateral value falls below 80% then there won't be any liquidation.

If we take a below scenario

Collateral = ETH price = $1000

1. Borrower deposits 1 ETH as collateral and borrows 80% of SC i.e 800 SC.
2. Borrower pays option fees to get downside protection and get a call option.
3. Borrower takes 800 SCs and invests in some token
4. The token decreases in price by 50% so the borrower has lost 400 SCs due to speculation.
5. The borrower now needs to buy $400 SC from the market more in order to return the $800 SC loan.
6. If the Collateral value also falls to 60% then there is no need to return the full $800 SC and instead the borrower has to return back $600 SC only. This is primarily because of the 80% downside protection offered.
7. As CDS swap depositors are being offered premium in terms of option & swap fees so their capital will be used to offer downside protection for any fall in value beyond 80% collateral amount. In the above particular case, CDS capital will be utilized by protocol to take $200 worth of value.

Implementation

Tools used for testing our approaches

Proven results

Comparison wrt to earlier work (benefits of our work)

What kind of tools will be utilized initially to bring out the product.

Expected results after implementation

Appendix

We are adding a financial model where we tested our model. We have built the model for 10 borrowers and 10 CDS depositors who are coming at different points of time at different ETH prices.The model could be extrapolated to 1000s of borrowers and CDS depositors. We have tried to calculate the change of P/L on the CDS pool with the change in ETH price. We have also calculated the split of P/L among all the CDS depositors on every new event like new CDS position opened, new borrower entered, borrower closing the position or any contract call by external user. This is basically the core model of our See-Saw function which is the function where assets move between ETH Vault and CDS pool with change in ETH prices.

Day	Total ETH	Initial ETH capital	ETH price	Initial CDS amount	P/L of CDS Pool	CDS depositors	CDS Depositor %age of ETH price
1	51	50000	1000	10000		1000	1
2	52		1010		510	1000	0.9900990099
3	53		1020		1030	1000	0.9803921569
4	54		1030		1560	1000	0.9708737864
5	55		1040		2100	1000	0.9615384615
6	56		1030		1550	1000	0.9708737864
7	57		1020		990	1000	0.9803921569
8	58		1010		420	1000	0.9900990099
9	59		1000		-160	1000	1
10	60		950		-3110	1000	1.052631579
							9.896899947

Table: 10 borrowers and 10 CDS depositors at different ETH prices

Initial CDS amount	Total CDS pool	Net value of CDS Pool	P/L of ETH Pool	ETH pool at market price	ETH Pool with P/L	Net ETH pool value	Ratio	Inverse of Ratio
10000	11000	11000		51000	51000	51000	0.216	4.636
	12000	12510	-510	52520	52010	52010	0.238	4.198
	13000	14030	-1030	54060	53030	53030	0.260	3.853
	14000	15560	-1560	55620	54060	54060	0.280	3.575
	15000	17100	-2100	57200	55100	55100	0.299	3.345
	16000	17550	-1550	57680	56130	56130	0.304	3.287
	17000	17990	-990	58140	57150	57150	0.309	3.232
	18000	18420	-420	58580	58160	58160	0.314	3.180
	19000	18840	160	59000	59160	59160	0.319	3.132
	20000	16890	3110	57000	60110	60110	0.296	3.375

Table: Total/Net ETH Vault and Total/Net CDS Pool with Pool ratios

Eth Price	Date	Daily returns	Daily volatility	Annual volatility
1215.480165	11/27/22 0:00			
1216.120944	11/26/22 0:00	0.001	3.35%	32.02%
1190.840868	11/25/22 0:00	-0.021		
1199.777785	11/24/22 0:00	0.007		
1163.074472	11/23/22 0:00	-0.031		
1110.720153	11/22/22 0:00	-0.046		
1122.223882	11/21/22 0:00	0.010		
1193.216625	11/20/22 0:00	0.061		
1210.534792	11/19/22 0:00	0.014		
1214.575382	11/18/22 0:00	0.003		
1205.69334	11/17/22 0:00	-0.007		
1230.465701	11/16/22 0:00	0.020		
1259.073674	11/15/22 0:00	0.023		
1230.783049	11/14/22 0:00	-0.023		

Above Table shows the ETH price change over a couple of days. However, we have calculated the daily volatility and annual ETH volatility from 26/07/2022 to 27/11/2022 period by observing the change in ETH price in this 4 month period.

S. No	Collateral deposited	Stablecoin borrowed at 60% LTV	Collateral value after week	LTV ratio after 1 week	Breach of LTV	Difference	Total required amount from CDS pool
1	345	207	318.53	0.65	15.88	138	20818
2	236	141.6	231.56	0.61	2.67	94.4	

3	156	93.6	158.58	0.59	-1.55	62.4	
4	803	481.8	812.90	0.59	-5.94	321.2	
5	258	154.8	267.45	0.58	-5.67	103.2	
6	224	134.4	248.15	0.54	-14.49	89.6	
7	851	510.6	954.78	0.53	-62.27	340.4	
8	371	222.6	382.68	0.58	-7.01	148.4	
9	912	547.2	935.88	0.58	-14.33	364.8	
10	287	172.2	298.99	0.58	-7.19	114.8	
11	911	546.6	958.09	0.57	-28.25	364.4	
12	441	264.6	441.18	0.60	-0.11	176.4	
13	723	433.8	705.52	0.61	10.49	289.2	
14	890	534	1055.66	0.51	-99.39	356	

Above Table applies a random number generator function for CDS deposit amounts over a time span of 100 days by tracking ETH prices over the same period also. We then calculate the LTV ratios and sum them up the values which breach the LTV ratio beyond a standard industry wide figure of 60% LTV. This gives us the total amount to be required from the CDS pool and by CDS depositors.

Another method of LP tokens minting mechanism to calculate P/L of every CDS position

Total CDS Deposited by users	CDS Amount Deposited at periodic intervals	Balance of CDS	Shares minted for the CDS deposit	Total shares
10000	10000	10000	10000	10000
11000	1000	11000	1000	11000
	510	11510	0	11000
12000	1000	12510	955.6907037	11955.6907
	520	13030	0	11955.6907
13000	1000	14030	917.5510901	12873.24179
	530	14560	0	12873.24179
14000	1000	15560	884.1512221	13757.39302
	540	16100	0	13757.39302
15000	1000	17100	854.4964606	14611.88948
	-550	16550	0	14611.88948
16000	1000	17550	882.893624	15494.7831
	-560	16990	0	15494.7831
17000	1000	17990	911.9942967	16406.7774
	-570	17420	0	16406.7774
18000	1000	18420	941.8356715	17348.61307

17840	-580	17840	0	17178.73205
18840	1000	18840	962.9334111	18141.66546
	-2950	15890	0	15078.10991
	1000	16890	948.9055954	16027.01551

Below Table describes the total shares left after change in CDS pool total value due to change in ETH price. We are able to calculate the final CDS amount for every open CDS position at any instant of time by looking at the total shares/LP tokens owned by the CDS depositor.

Shares minted for the CDS deposit	Total shares	Shares burned	Total Amount during withdrawal	Final CDS Amount withdrawn
10000	10000	0		
1000	11000	0		
0	11000	0		
955.6907037	11955.6907	0	1046.363636	1046.363636
0	11955.6907	0		
917.5510901	12873.24179	0	1043.333333	1089.857568
0	12873.24179	0		
884.1512221	13757.39302	0	1040.769231	1131.028239
0	13757.39302	0		
854.4964606	14611.88948	0	1038.571429	1170.279862
0	14611.88948	0		
882.893624	15494.7831	0	963.3333333	1132.639282
0	15494.7831	0		
911.9942967	16406.7774	0	965	1096.498085
0	16406.7774	0		
941.8356715	17348.61307	0	966.4705882	1061.756345
0	17178.73205	-169.8810152		160
962.9334111	18141.66546	0	967.7777778	1038.493408
0	15078.10991	-3063.555554		2950
948.9055954	16027.01551	0	844.7368421	867.3074719

Some other concepts to be utilized in future.

Bonds Tokens - In case, the fees offered is less for CDS owners in comparison to the downside protection offered, we will be generating a new token called bond/hedge token which will be given to CDS once they unlock their deposit after 1 month. This bond/hedge token will have a maturity of 6 months. 1 bond/ hedge token is equivalent to 100 stablecoins at maturity after 6 months. Therefore, after 6 months the CDS owner can use this bond/hedge token to get the full value (100 stablecoins). This bond/ hedge token can also be traded before the maturity with other participants.

References and Citations to be added.
2021,2022,2023

1. https://country.eiu.com/article.aspx?articleid=1532551136&Country=United+States&topic=Economy&sub_1
2. http://csinvesting.org/wp-content/uploads/2015/10/Artemis-Q32015-Volatility-and-Prisoners-Dilemma.pdf
3. https://www.philadelphiafed.org/-/media/frbp/assets/economy/articles/economic-insights/2016/q3/eiq316_free_banking_era.pdf
4. https://docs.makerdao.com/
5. Jarno, K.; Kołodziejczyk, H. Does the Design of Stablecoins Impact Their Volatility? *J. Risk Financ. Manag.* 2021, *14*, 42.(CrossRef)
6. https://arxiv.org/pdf/2204.11107.pdf
7. Clements, R. Built to Fail: The Inherent Fragility of Algorithmic Stablecoins. Wake For. Law Rev 2021, 11, 131 (CrossRef)
8. https://hackernoon.com/tokenomics-of-different-stablecoins-ttg33ut
9. Briola, A.; Vidal-Tomás, D.; Wang, Y.; Aste, T. Anatomy of a Stablecoin's Failure: The Terra-Luna Case. Financ. Res. Lett. 2022, 51, 103358. (CrossRef)
10. Saengchote, Kanis, A DeFi Bank Run: Iron Finance, IRON Stablecoin, and the Fall of TITAN (July 16, 2021). Available at SSRN: https://ssrn.com/abstract=3888089 or http://dx.doi.org/10.2139/ssrn.3888089
11. https://hbr.org/2021/08/stablecoins-and-the-future-of-money
12. https://www.hkma.gov.hk/media/eng/publication-and-research/research/research-memorandums/2022/RM09-2022.pdf
13. https://www.newyorkfed.org/medialibrary/media/research/epr/08v14n2/0809bech.pdf
14. Hassan, M., Ngow, T., Yu, JS. et al. Determinants of credit default swaps spreads in European and Asian markets. J Deriv Hedge Funds 19, 295–310 (2013). https://doi.org/10.1057/jdhf.2014.1
15. https://compound.finance/markets