

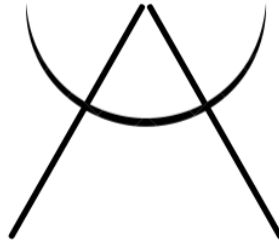
Angle Whitepaper

A Decentralized Protocol for Stablecoins with Liquidity Providers

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Abstract

Angle is a decentralized protocol that aims to facilitate the creation of stable cryptocurrencies. By connecting Users and Liquidity Providers (LPs), Angle allows full and unrestricted convertibility of collateral against stable assets and conversely at a 1:1 rate. It provides users with secure, easy to mint and burn stable assets, and Liquidity Providers with valuable returns on their investment. Angle's protocol is meant to be over-collateralized meaning that there will always be cryptoassets supporting the value of the synthetic stable assets minted. In the first place, the goal of Angle is to build stablecoins pegged to the Euro and the Dollar. In a second time, it will be generalized to different asset classes.

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1 Introduction

Decentralized Finance (DeFi) is expanding, and the market for digital assets and in particular for stablecoins is democratizing by the hour. Unfortunately, up to date, stablecoin protocols remain incomplete in the following ways:

- The stablecoins with the largest market capitalization remain centralized projects (USDT [1], USDC [2]) that require trust in a third party.
- As for decentralized protocols (Maker [3], Synthetix [4]), they rely on complex logistics which make it difficult for basic users to mint and burn stable assets by themselves. It is not within reach of everyone to own and maintain vaults or collateralized debt positions like required by most stablecoins protocols nowadays.
- Besides, full and unrestricted 1:1 convertibility of collateral against stable assets (and conversely) has not been reached yet for any of the decentralized protocols. The consequence of this is that the stability of the underlying tokens of current decentralized projects relies on the active intervention of trained people ("keepers" on Maker) and on careful choice of protocols' parameters (like the stability fee).
- There is still no decentralized protocol dedicated mostly to building stable Euros. Some protocols like Mirror [5] or Synthetix enable minting stable Euros but besides their limited and restricted convertibility, they are barely used for that. As a consequence, most lending protocols on which users can lend their stablecoins and earn interests on it do not accept stablecoins pegged to Euro: people willing to receive interests on a stable coin have to do it through a stable dollar. The problem for people in Europe (or in other countries where USD is not the main currency) is that they are subject to a change risk. They may earn an annual yield of 10% on their stable USDs on Compound but if in the meantime USD crashes with respect to their currency, they could end up with a positive net loss in their currency.

The aim here is to introduce Angle, a protocol that remedies the flaws of current approaches and makes the best of centralized and decentralized protocols. Angle achieves it by proposing a decentralized version of centralized protocols with a full and unrestricted convertibility between synthetic assets and collateral. The idea with Angle is to enable the spread and democratization of digital stable assets pegged to Euro and other fiat currencies, and to be a building block of tomorrow's DeFi and bankless society.

In section 2, Angle's main aspects will be introduced. The objective is to present the main innovations and key takeaways of Angle in a few pages. Then, section 3 will go more into details.

2 The Angle Protocol

2.1 Goal

The goal of Angle's protocol is to mint stable assets tradable on the blockchain. For the purpose of the examples, this paper will consider a stablecoin pegged to the Euro (€) called aEUR tradable on the blockchain (on Ethereum [6], on Solana or potentially another blockchain).

The basic principle for Angle is to let users buy aEUR, at any moment, with the collateral of their choice (among a whitelist of collaterals), and with as little fees as possible. Similarly, owners of aEUR should be able to exchange it seamlessly at anytime with the collateral of their choice and with as little fees as possible.

As explained in more details later, the protocol will need to rely on LPs to bring extra collateral to the protocol (i.e. over-collateralize it). These LPs are assumed to be risk takers: they lend money to the protocol at an advantageous yet variable rate, but with the risk of losing a part of it if the protocol needs to reimburse aEUR owners.

2.2 Unrestricted Convertibility

2.2.1 Mint and Burn Transactions

Angle is designed to be as simple as possible from a user perspective and like USDC or USDT, it relies on full convertibility of collateral and stable assets. To generate a stable asset, a user just has to send to the protocol a whitelisted collateral. An oracle then determines how many stablecoins need to be minted and sent to the user. Stablecoins will be represented by tokens tradable on the blockchain. For example, on Ethereum it will be ERC-20 tokens, on Solana it will be tokens with the SPL standard.

EXAMPLE 2.1

Assume, like in the rest of the paper, Angle is available on Ethereum, and accepts as collateral ETH, the native token of Ethereum's blockchain.

If the oracle price for a ETH is 10€, and if the transaction fees are 0.3% of the transaction, then a user giving Angle 100 ETH will receive 997 aEUR newly minted by the protocol.

The same procedure works when users are willing to cash out: they just have to send to the protocol their stable assets and they receive in return the chosen collateral in an amount depending on the collateral price and on the transaction fees. The stablecoins received by the protocol are then burnt.

EXAMPLE 2.2

If the oracle price for ETH is 10€, and if the transaction fees are 0.3%, then a user giving Angle 10 aEUR will receive in exchange $\frac{0.997}{10} \cdot 10$ ETH. The 10 aEUR received are then burnt by the protocol.

Note that if there are fees in this protocol, it is to remunerate LPs which guarantee the robustness of the system and also at some times incentivize users to trade their stable assets on the open market rather than with the protocol.

2.2.2 Stability

The convertibility as described by the protocol is what makes the tokens minted stable. Direct arbitrage opportunities arise whenever the token trades at a price different from its peg.

EXAMPLE 2.3

Let's say that 1 aEUR trades at a price above 1€. The incentive is to mint aEUR for 1€ worth of collateral and then sell these newly minted aEUR for more than 1€ on the market. This reduces the price closer to €1.

Opportunities for arbitrage are however reduced when there are transaction fees. With a 5% transaction fee, it is no longer profitable to do arbitrage for price deviations of less than 5%.

With Angle protocol, and more particularly with full and unrestricted convertibility, as long as the protocol is running and as there are arbitrageurs, the stability of the minted assets is therefore guaranteed.

2.2.3 Main difference with other stable assets

The use cases of such a protocol differ from the ones of current decentralized protocols. In Maker, when people mint DAI, they still own the ETH they put as collateral. Besides they have to pay interests for the DAI they minted. People typically use DAI to get leverage on their collateral, and Maker can be viewed as a cheap way to borrow money in order to get leverage.

In the case of Angle (and in the case of USDT or USDC too), when someone gives collateral to mint stablecoins, this collateral no longer belongs to the person. Hence, as a user, you cannot use a protocol like Angle to get leverage. When you are a user, you simply use Angle to convert your collateral to a stable asset. From a financial point of view, users are thus likely to mint aEUR (or any other stable asset) with Angle if they believe that the price of their collateral is going to decrease and if they want to keep on-chain assets.

From a larger point of view, Angle aims at democratizing digital stable assets, and bringing risk averse users to digital and decentralized protocols. With small transaction fees, stable assets should be able to have the same use cases as standard currencies.

2.3 The Need for Over-Collateralization

At this point, it has been shown how useful and key the full and unrestricted convertibility is. To be able to maintain it, Angle needs to have enough liquidity at all times in its reserves. An important metric to track this is the collateral ratio:

$$\text{collateral ratio} = \frac{\text{value of collateral in reserves}}{\text{value of stablecoins minted}}$$

This collateral ratio will vary not only after "mint" and "burn" transactions, it will also vary continuously as the price of one of the collateral changes.

EXAMPLE 2.4

Imagine there is 1 ETH in the protocol worth 10€, and 10 aEUR minted, the collateral ratio is 100%. If the price of ETH decreases to 5€, the collateral ratio is now 50%. Then, someone could come with 5 aEUR and get 1 ETH in exchange leaving no collateral left for the owners of the 5 remaining aEUR. The intrinsic value of these tokens is then no longer €1. To keep the confidence in the protocol and to be able to sustain convertibility, at least 100% collateralization is needed at all times.

This example in fact corresponds to a bank run for centralized banks. The goal is to be able to reduce significantly this risk, and to build trust on Angle. While banks usually lend/mint more than what they own in their reserves, it would not work for Angle without a huge trust on the protocol. This idea of having less than 100% collateralized protocols

has not been explored much in the context of stablecoin protocols. It may hold assuming users are never going to try all to exchange their aEUR against real collateral at the same time.

Like most decentralized stablecoin protocols, Angle will still aim for over-collateralization: this is the best solution to avoid being insolvent after a change in collateral price, to maintain the trust of the users and to hold enough liquidity at all times.

The solution proposed by Angle to get over-collateralized is to resort to Liquidity Providers (LPs), that is extra agents that bring collateral to the protocol, collateral which will then serve as a basis for over-collateralization. To maintain the adequate collateral ratio and to manage its risk, Angle introduces two types of LPs.

2.4 Liquidity Providers

2.4.1 Hedging Agents: HAs

Angle by essence is highly dependent on collateral volatility, as the protocol is owning the reserves from minting transactions and from SLPs. Angle's core purpose is to maintain the peg to assets and a collateral ratio above 100%. While surges in collateral prices are beneficial to the protocol, drops are less desirable. For this reason, Angle created a way to transfer the volatility to other actors willing to get leverage on collateral: the Hedging Agents (HAs). They are the agents insuring the protocol against drops in collateral price or surges in stable asset price, making sure that the protocol has always enough reserves to reimburse users.

In a nutshell, HAs leverage their exposure to a collateral / stable asset rate with the collateral in the protocol from users which minted stablecoins. This means that with their initial investment they will take all the volatility of the larger amount they are backing, earning a lot in case of a price increase, but incurring significant losses when price goes down.

For instance if they choose to back 1 ETH and the value of ETH increases from 9€ to 10€, then HAs will receive their initial investment plus the 1€ value increase in ETH at the new price. As 1 ETH is now worth 10€, besides their initial investment, they thus receive 0.1 ETH.

HAs will never be able to back up an amount superior to the collateral that was brought by users. For instance if users gave 10 ETH to mint aEUR, HAs can only take the volatility of up to 10 ETH.

HAs are hence risk takers: they are exposed to the variation of the collateral price with respect to the stable asset price, with a leveraging effect on their investment.

EXAMPLE 2.5

Back to the previous example. Let's say that 10000 aEUR were minted with 1000 ETH backing it, and that 1 ETH is worth 10€. A HA enters the protocol with 100 ETH, and chooses to take the volatility of 500 ETH of the protocol.

- If the price of ETH increases, say to 12 : 1 (meaning that 1 ETH is worth 12€). $1100 - 1100 \cdot \frac{10}{12}$ ETH are now over-collateralizing user-minted assets.

The HA is backing 500 ETH of the non LPs owned collateral, meaning she is entitled to get all the capital gains of these 500 ETH. 500 ETH were worth 5000€, and now they are worth 6000€, the capital gain here is 1000€. The HA can therefore claim besides her initial ETH the capital gain in ETH at the new price, that is to say $(6000 - 5000)/12 = 83.34$ ETH. So as the price only increased by 20%, the HA earned 83.34 ETH and a return on investment equal to:

$$\frac{100 \cdot 12 + 83.34 \cdot 12 - 100 \cdot 10}{100 \cdot 10} = 120\%$$

- Now, say the price of ETH decreases to 9.09 : 1. The 500 ETH the HA is backing have encountered a loss of 50 ETH: these 500 ETH were indeed worth 5000€ and they are now worth 4545€. So in ETH at the new price, the capital loss is: $(5000 - 4545)/9.09 = 50$ ETH. If the HA wants to cash out at this point, she will only be able to get back $100 - 50 = 50$ ETH.
- At some point, if the price drop is too important, the value of the 500 ETH in Euro may be at the current price more than 100 ETH inferior to the initial value of the 500 ETH when the HA came in. At this point, the HA would have lost her initial investment.

HAs are therefore in a win-win cooperation with the protocol. They earn incentives and have a risky but interesting leveraged investment. In return, they reduce the exposition of Angle to price variations, which can seize their money in case of collateral price drops. A more complete description of HAs is available in section 3.2.1.

If HAs covered at all times the collateral that has been brought by users that got stability, the protocol would remain perfectly collateralized, and convertibility could always be maintained regardless of variation of collateral price. In such a case, the protocol would be a perfect marketplace between people willing to get stability and people willing to get volatility doing so by taking the volatility of the collateral of people who wanted stability.

Yet, at a given point in time, specially after a new user comes in, or after an exit of a HA, there may be mismatches, and not all users' positions may be covered. A new type of liquidity providers is therefore needed to account for these temporary imbalances and to serve as a buffer between users and HAs: they are called Standard Liquidity Providers.

2.4.2 Standard Liquidity Providers: SLPs

Description Standard Liquidity Providers entrust Angle with their liquidity but do not want to be directly exposed to the changes in collateral price. They will therefore get back their investment plus interests, but the risk for them is to incur a slippage in times where the protocol is under-collateralized to be able to cash out, thus not being able to get everything that they brought to the protocol. They are equivalent to lenders on Compound or basic yield farmers on other platforms.

Incentives for SLPs When lending money to over-collateralize the protocol, SLPs are taking a risk. They should be incentivized for taking this risk. More details will be given about it in section 3. Overall, there are three types of incentives:

- A big fraction of the transaction fees obtained when minting or burning synthetic assets will be redistributed to SLPs in proportion to how much they contribute to the protocol.
- SLPs will be rewarded governance tokens, also based on how much they contribute to the protocol. These tokens which will be called MUR tokens will have a value, and be tradable on the open market. Besides the right to participate to governance votes, these tokens will provide advantages when interacting with the protocol.
- At each point in time, the protocol will own reserves which are only useful when redeemed by a user, a SLP or a HA. Part of the reserves will automatically lent to lending protocols like Compound [7] or Aave [8]. SLPs would then end up earning interests not only on the collateral they lent but also on the collateral brought by people who minted stablecoin.

EXAMPLE 2.6

Suppose the protocol owns 1.5 ETH out of which 1 come from users who minted and 0.5 come from LPs. If all the money of the protocol is lent, LPs will be receiving interests on 1.5 ETH although they just brought 0.5 ETH: they receive 3 times more interests than they would get by lending directly to other protocols.

In general, the less SLPs there are, the more a single SLP, for a similar amount invested, can receive transaction fees, governance tokens, and interests. This mechanism thus incentivizes SLPs to re-collateralize the protocol when it is

not collateralized enough because of a lack of SLPs.

Risks for SLPs While HAs can get liquidated if their position is too small, and although there can be big rewards and great incentives for being a SLP in the protocol, there are also some risks associated with it. SLPs are here to ensure the collateralization of the protocol in the situations when there are no perfect matches between users and HAs. If the protocol is not collateralized enough, they are at risk of not being able to get all their money back: there will be a slippage when the protocol is not enough collateralized.

EXAMPLE 2.7

Let's say that 10000 aEUR were minted with 1000 ETH backing it. First say 1 ETH is worth 10 aEUR, so the protocol is fully collateralized. Then a SLP brings 100 ETH to the protocol. She will earn the fees and the yield rate of the whole 1100 ETH available plus the transaction fees accruing in the meantime. But if in the future 1 ETH is only worth 8 aEUR, the protocol is under-collateralized and the SLP will not be able to get all her money back when exiting. On the opposite, if 1 ETH now worth 11 aEUR, the SLP will be able to enter and exit the protocol as she wants.

A more complete description of SLPs is available in section 3.2.2.

2.5 Summary

- Angle is a decentralized protocol to create truly-stable crypto-assets. It has been designed to be capital efficient and highly scalable
- Angle innovates by proposing full convertibility at a 1 : 1 rate between stable assets and collateral.
- The protocol involves 3 populations which all benefit from Angle: Users who issue and use stable assets, Hedging Agents, who use the protocol to leverage their exposure to an exchange rate while helping the protocol deal with the variability of the collaterals' prices and Standard Liquidity Providers, who help the protocol have enough liquidity at all times.

3 Implementation & Details

The previous section was a rapid overview of what the Angle protocol is meant to be. In this part, more details are given about how the protocol will work effectively, and its sets of incentives designed to make it safe.

3.1 Vocabulary

- Users: people using the protocol to mint/burn and use stable assets.
- SLP: Standard Liquidity Provider.
- HA: Hedging Agent.
- aEUR: a generic stable asset. In the first place, there will be Euro and Dollar stablecoins, but the protocol aims to generalize easily and many stablecoins will be supported.
- sanETH-EUR: tokens representing the property of a liquidity pool as a SLP (here ETH) for the aEUR stablecoin.
- MUR: governance tokens of the protocol.

3.2 The Different Types of Liquidity Providers

As stated above, two types of Liquidity Providers will interact with the protocol. As Angle plans to accept various types of collateral, LPs (SLPs or HAs) contributing to different collaterals will also be treated differently by the protocol.

3.2.1 Hedging Agents: HAs

The first type of LPs, Hedging Agents denoted HAs, are leveraging on the collateral price using pools of collateral coming from users which issued stable assets. They assume the risk inherent to the protocol. Let's begin by an example to understand the situation.

EXAMPLE 3.1

Let's say that there are 100 ETH backing 1000 aEUR at a 10 : 1 exchange rate. The main risk for the protocol is a price drop (or an increase in the stable asset's price): if the exchange rate goes to 9 : 1, Angle is under-collateralized. On the opposite, Angle can be over-collateralized and have a surplus of collateral. Angle will "sell" the variability of collateral from users to HAs.

A HA will enter a contract with the protocol, with an amount x of ETH. She will also choose the amount of collateral y from users wanting stability she would like to take the variability of. Unless her return reaches 0 at some point, in which case she will be liquidated, she will therefore earn:

$$x + y \cdot \left(1 - \frac{\text{initial price}}{\text{current price}}\right)$$

To understand this formula, the reader can refer to the examples of section 2.4.1. This basically means that the HA will get back her input x , plus the variation that the amount y she committed herself to go through. The consequence of this is that the input of the HA can go to zero, if the price is such that:

$$x = y \cdot \left(\frac{\text{initial price}}{\text{current price}} - 1\right)$$

Or reformulating this, if the prices drops to:

$$\text{current price} = \frac{y}{x+y} \cdot \text{initial price}$$

EXAMPLE 3.2

Continuing on the previous example, if there is a HA with $x = 10$ and $y = 50$, this HA takes the variation of 50 ETH besides her 10 ETH. So if the price goes to 12 : 1, the HA will earn a leveraged return of $10+50(1-10/12) = 18.33$ ETH. On the opposite, if the price for one ETH drops to $\frac{50}{60}10 = 8.33$, the HA will have lost her investment, which will be absorbed by the protocol to stay collateralized.

The interest of this is that HAs are taking the risk and reward inherent to the protocol. In a fully liquid market, Angle could even try to ensure all its funds by HAs at all times. In this case, there would be no risks in the protocol anymore.

Note by the way HAs getting leverage are the same type of people than vault owners on Maker or borrowers on Compound willing to get leverage.

EXAMPLE 3.3

To conclude this explanation of the role of HAs, let's do a more complete example. Assume the initial state of the protocol is the following:

	initial price: p
Collateral brought by Users	x
Collateral brought by SLPs	y
Collateral backed up by HAs	z

Table 1: Initial state of the protocol

Then, assume that at a second point in time, Users and HAs want to cash out.

	current price: q
Amount due to Users	$x \cdot \frac{p}{q}$
Amount due to HAs	$z(1 - \frac{p}{q})$
Fees and returns accumulated for SLPs	r

Table 2: Current state of the protocol

After this cash out, Angle will be left with:

$$y + r + (x - z)(1 - \frac{p}{q})$$

Therefore, in case of a price increase, the protocol will have a surplus proportional to $(x - z)$, and in case of a price drop, the risk of not being able to reimburse SLPs is significantly reduced if $x - z$ is close to 0, so if all the funds are backed by HAs.

HAs will never be able to back up an amount superior to the collateral that was brought by users: hence Angle will always have $z \leq x$. To enforce this bound, the protocol have to check the amount of collateral not backed by HA when one wants to enter the protocol. But it also needs to cash out HAs when users burn an amount that makes $z > x$. This feature does not change HAs returns, as their positions are updated and then cleared from the protocol. The protocol will rely on incentivized people called keepers (see) to liquidate some HAs positions when there are too many HAs. These keepers will get a fraction of the fees that were paid by HAs opening their vaults for doing so.

In the beginning, to let the protocol accumulate some surplus and preserve some liquidity, it is possible that Angle imposes $z \leq k \cdot x$ where k is a parameter set by governance with $0 \leq k \leq 1$.

Another remark, to prevent HAs from taking advantage of potential oracle failures or insiders' advantages, there will be a one hour lock after each update in the position of a HA: someone becoming a HA will never be able to exit in the hour following her entrance in the protocol.

3.2.2 Standard Liquidity Providers: SLPs

SLPs are the second type of liquidity providers making the protocol fully functional and robust to adverse market conditions.

sanTokens When contributing to a collateral pool as a Standard Liquidity Provider, a SLP receives a token marking her belonging in the pool, just like a lender on Compound would receive a `cToken`. For instance, a SLP bringing `ETH` to the protocol for the `aEUR` coin would receive `sanETH-EUR` tokens based on the current exchange rate between `sanETH-EUR` and `ETH`. This exchange rate will vary across time as transaction fees will arrive in that pool and as interests from money being lent are going to be collected.

The `sanTokens` are going to be tradable tokens with the `ERC-20` standard on Ethereum. Hence, a SLP willing to cash out and exit a liquidity pool could do so either by redeeming her collateral back to the protocol or by selling on the open market her `sanTokens`.

By issuing `sanTokens`, SLPs earn interests and rewards through the underlying token exchange rate, which increases in value relative to the underlying asset.

EXAMPLE 3.4

Let's say that a SLP supplies 1,000 `ETH` to the Angle protocol, when the exchange rate is 0.020070: it would receive 49,825.61 `sanETH-EUR` ($1,000/0.020070$). A few months later, this SLP decides that it is time to withdraw her `ETH` from the protocol. As transaction fees arrived to the `ETH` liquidity pool and as the `ETH` lent by Angle to lending protocols brought interests, the exchange rate increased: it is now 0.021591. The 49,825.61 `sanETH-EUR` are now equal to $49,825.61 \times 0.021591 = 1,075.78$ `ETH`. This SLP could then withdraw 1,075.78 `ETH`, which would redeem all 49,825.61 `sanETH-EUR`.

Or, she could withdraw a portion, like her original 1,000 `ETH`, which would redeem 46,315.59 `sanETH-EUR` (keeping 3,510.01 `sanETH-EUR` in her wallet).

Rewards It is important to note that a given SLP only receives transaction fees from transactions which concern the pool she contributes to. Transaction fees from a mint transaction affecting the `USDC` liquidity pool will not go to SLPs and HAs which contributed to the `ETH` liquidity pool.

By saying that transaction fees go to a liquidity pool, it is implied that these transaction fees make the exchange rate `token : sanToken` vary. The variation of the exchange rate will be such that as a SLPs, you will receive a proportion

of the transaction fees earned depending on how much you contributed.

Angle will be able to lend its reserves to Compound and Aave, and hence distribute interests to SLPs. SLPs will thus be able to earn interests not only on their collateral but also on the collateral received in exchange of the issued stablecoin. There would hence be an interesting multiplier effect for them.

Besides the transaction fees and the interests from the reserves lent to other protocols, SLPs (and HAs too in some rare occasions) also receive governance tokens from the protocol at each block. The rationale is that their interests are aligned with those of the protocol. If the protocol is healthy and maintains a healthy rate of collateralization, then it goes in the interests of SLPs which are in this situation sure to be able to get their money back, and to keep receiving interests.

As detailed more precisely later, the distribution of governance tokens across pools will not only depend on the proportion of each pool in the total collateral of the protocol, governance parameters could also be set to adjust the distribution and incentivize some liquidity pools with respect to others.

Risks SLPs are at risk of not being able to redeem their money at all times. When the collateral ratio falls below a certain threshold, in order not to harm the protocol and to accelerate the pace at which the collateral ratio decreases in the case of a price drop (or of a surge in the price of the asset the protocol tries to peg, both are completely equivalent), the protocol will block SLPs from exiting as they would like.

As explained in more details in 3.7, SLPs willing to redeem their collateral against their `sanTokens` will face a slippage factor depending on the current collateral ratio when exiting.

3.3 Users

Angle aims at facilitating users' interactions with the protocol. The full and unrestricted convertibility is essential for the users' perspective. Still, it is possible that the reserve of a particular collateral is empty even if the protocol is over-collateralized. For instance, the minted stablecoins can be entirely backed by USDC and have no ETH in reserve. In this case, if a user wants to cash out y aEUR using a collateral C and there are not enough reserves of this collateral to exchange it fully in C , then the protocol simply exchanges the maximum amount in this collateral and leaves the user with remaining aEUR, which the user will be able to burn for another collateral C' in another transaction.

EXAMPLE 3.5

Let's say that the protocol owns 10 ETH and 100 USDC, at a 4 : 3 exchange rate for the Euro versus the Dollar. A user wants to burn 150 aEUR for USDC. There are not enough reserves in USDC to fully burn the amount proposed by the user. The protocol will then burn $100 \times \frac{3}{4} = 75$ aEUR and will give 100 USDC to the user and will leave her 75 aEUR, which she will be able to exchange against another collateral.

3.4 Keepers

There is another type of actors that was voluntarily not mentioned in the first part of this document: it is actors which help the protocol achieve its desired outcome and work as it was designed to work, they are called, like in MakerDAO, keepers. They are incentivized to perform actions that should be done pretty regularly but that are not performed automatically by the protocol because they would require too much gas if they were done at each transaction.

3.4.1 Keepers for HAs

Keepers were introduced in the part about HAs. If HAs commitment is too big compared with what has been brought by users, then some positions should be closed. The same goes for the liquidation of HAs: if the position of a HA is inferior to 0, this position should be liquidated. In both cases, the protocol, which is inherently passive, relies on

keepers for doing so.

As an incentive, keepers get a fraction of the transaction fees that were paid by the HA when opening her vault. In the case where there are too many HAs, in order not to incentivize keepers to cash out the biggest HAs, the fraction of fees going to keepers will be chosen to be most important for vaults that bring the system close to the desired value of coverage by HAs, and the amount that will be given to keepers will be capped.

3.4.2 Keepers for SLPs

Fees and yields from lending will be given to SLPs. Because it is too expensive to update the exchange rate between `sanTokens` and collateral each time fees accrue, the protocol relies on keepers to call the function which will update this exchange rate based on all the fees that were accumulated.

Keepers will also be the agents helping the protocol interact with the lending platforms. It is possible that a given moment a too important proportion of collateral has been lent to a lending protocol, keepers will be the ones adjusting the lending ratio to make sure that there are always enough reserves held on contract to pay users, SLPs or HAs which want to exit the protocol. The adjustment will be done within the defined lending bounds of the protocol.

SLPs willing to get as much returns as possible or governance token holders acting for the good of the protocol are the ones which are expected to call the concerned functions that will put the lending ratio within the desired bounds.

3.4.3 Keepers for Transaction Fees and Slippage

As detailed below in 3.6.1, the structure of the transaction fees of the protocol heavily depends on its collateral ratio. It is pretty expensive to compute on-chain the collateral ratio of the protocol: keepers will be the ones calling the function updating the transaction fees based on the collateral ratio to make sure that the fees that are taken for users minting and burning as well as for HAs creating or cashing out their vault match the current state of the protocol.

3.4.4 Keepers for Arbitrage

The tokens issued by the protocol will be tradable on exchanges and therefore have a market price. To make the price of these tokens stable, the protocol relies on arbitrageurs which have profitable opportunities whenever the market price of the tokens deviate from peg. Arbitrageurs are hence another type of keepers.

3.5 Target Collateral Ratio

LPs are here because they help maintain the collateral ratio of the protocol to a desired value. The desired value is the one that helps Angle reach its goals, that is to say: let at any moment users who want to exchange `aEUR` \rightleftharpoons `collateral` with as little fees as possible.

Besides these two goals, as LPs are part and parcel to the well-functioning of the protocol, the protocol should do everything to guarantee that they will be able to come in or out with their full rewards at any time they want.

With humility, it is hard to know what the best collateral ratio could be for the protocol. Like most successful decentralized stablecoin protocols, Angle will target a 150% collateral ratio. The following points are still to be taken into account:

- In the long run, it is possible that the protocol keeps working effectively with a collateral ratio below 100% provided that users do not withdraw all their money at the same time. However Angle will try to avoid this situation for the moment.
- In the end, the collateral ratio chosen will depend on the effectiveness of the incentives offered by Angle and on the capacity of the protocol to attract HAs and SLPs.

3.6 Variable Transaction Fees for Users and HAs

Variable transaction fees can be a useful tool when the collateral ratio of the protocol starts falling below a dangerous threshold or when there are not enough HAs covering the collateral of users. They can deter(or incentivize) users from interacting with the protocol when it is at risk (or safe), they may incentivize SLPs to re-collateralize the protocol when there is potentially not enough collateral for all owners of aEUR and also incentivize HAs to open new positions.

3.6.1 For Users

Observations There is nothing obvious when it comes to choosing which transaction fees and penalties to set based on the collateral ratio and on other metrics that could be useful for the protocol. As other metrics, one interesting ratio is the ratio between the amount redeemable by LPs (amount the protocol could give to LPs if all aEUR had been converted against collateral) and the amount that is owed to LPs.

- During "mint" transactions, where users give collateral in exchange for aEUR, they reduce the collateral ratio of the protocol. During "burn" transactions, users increase the collateral ratio of the protocol (provided that the collateral ratio is superior to 100%).
- More transaction fees do not necessarily mean more money to the protocol and to LPs. It is indeed possible that increasing transaction fees negatively affects the volume of transactions because it becomes too prohibitive to interact with the protocol: an optimum thus has to be found.
- Users will be able to buy aEUR or sell it on the open market. Hence depending on how much it can be valuable for the protocol depending on its collateral ratio to have users interacting with it, transaction fees can change to values above or inferior to that of the market.

Implementation Transaction fees for users will be set as a piecewise linear function of the collateral ratio. The protocol will have as parameters breaking points of collateral ratio and their corresponding value.

The breaking points and values will be chosen so that when the protocol is healthy and heavily collateralized then Angle will let users interact with it as much as they want, and set restrictions when it starts to be in a less healthy position. "Mint" and "burn" transactions, although they have opposite effects on the collateral ratio, will thus be treated indifferently in terms of transaction fees by Angle protocol.

Besides, as the protocol is to be as simple as possible for users who should not have to worry about the state of the reserves of the protocol, the transaction fees will be the same regardless of the collateral provided by the users. A user giving Angle 1000€ worth of ETH will receive as many aEUR as a user giving the protocol 1000€ worth of USDC.

If a 150% collateral ratio is targeted, then:

- If `collateral ratio > 150%`: take fixed transaction fees of 0.3%. This corresponds to what is taken by Tether and is inferior to the 0.5% taken by most exchanges.
- If `collateral ratio < 150%`: increased transaction fees will be taken. The aim could be a 5.6% transaction fee at a 100% collateral factor and 0.6% at 150% collateral, with an affine evolution between 150% and 100%. Below 100%, an affine evolution with 25% transaction fees if the protocol is collateralized at 50% (or another figure) could be interesting.

Note that what is proposed is just tentative target ratios and values for the transaction fees: this still needs to be calibrated at implementation.

3.6.2 For HAs

HAs pay transaction fees when they open their vault, add or remove money from it, and cash it out. HAs are essential to the success of the protocol, the protocol should therefore still be able to attract them at all times.

Fees when depositing to the protocol The offer for HAs is very attractive: with Angle they are able to get leverage in a direct way and with the multiple they want without having to do multiple transactions like on Maker or Compound where they have to lend, borrow then swap.

In case where the protocol is healthy and has almost all the collateral from users that is covered by HAs, there is no need for the offer made to the HAs to be particularly attractive with respect to other protocols. It could be an objective to align the protocol to what it costs to get leverage on Compound.

But, when there are not enough HAs (because fewer people wants to be long on collateral), then the incentives for HAs should be boosted and fees will be reduced: that way it is going to be more attractive for HAs to go to the protocol rather than with other protocols.

Fees when exiting the protocol Angle is better off with having HAs which stay for a long time. The protocol is indeed a marketplace and having lots of movement among HAs may cause harmful temporary imbalances between collateral from users and the coverage from HAs. The protocol will hence reward at exit HAs which stay for a long time with the protocol.

Exit fees will therefore be more important for HAs which did not stay long. Concretely, a piecewise linear function of the time spent as a HA will set the transaction fees.

3.6.3 Feed the surplus of the protocol

What was implicitly suggested above was that transaction fees and lending returns would all be distributed to SLPs. Yet, in the beginning, to create a surplus buffer for Angle, part of these fees and returns will go to the protocol directly without being redeemable by any SLP. Note by the way that transaction fees from HAs will never be reversed to SLPs.

The surplus buffer will also increase if the price of the collateral brought by users who minted aEUR increases with respect to Euro (and if everything is not fully covered by HAs). Overall, it will help the protocol in case of big price drops maintain a sufficiently high collateral ratio regardless of LPs (SLPs or HAs) cashing out. In addition, governance will be able to vote to burn governance tokens against part of the surplus (like Maker does) or to give money to Angle Labs core team in a development fund.

In the beginning what will certainly be done is that all the fees will go to the surplus to provide liquidity to the protocol, and SLPs will mainly be incentivized by governance tokens. Then, in a second time, transaction fees and lending yields will be distributed to SLPs and the amount of governance tokens distributed will decrease.

3.7 Restrictions to Exits and to Rewards for SLPs

When the collateral ratio is too small, in order to guarantee that any owner of aEUR will be able to redeem collateral with aEUR, it may be necessary to prevent SLPs from exiting, to incentivize them not to do so, or even better to incentivize them to re-collateralize the protocol.

3.7.1 Transaction Fees Aside

One rule that can be set to incentivize SLPs to re-capitalize a pool when the overall collateral ratio of the protocol is too low is putting aside progressively part of the transaction fees that should arrive to SLPs of this pool. These fees will only be recovered by SLPs once the pool becomes collateralized again, and they will be distributed in a proportion that depends on the composition of the pool at the time of re-collateralization. This means that a new SLP giving money to re-collateralize a pool may receive transaction fees for transactions that occurred before her arrival in the pool. Concretely, this means freezing the exchange rate of the sanToken, and unfreezing it later on.

A piecewise linear function of the collateral ratio (called by keepers) will be used to compute how much of the fees should be left aside. Here what the protocol will look for is its overall collateral ratio and not the collateral ratio for one collateral type. If the protocol is unhealthy because the price of only one collateral dropped but not the price of the others then all LPs will be concerned by the transaction fees put aside regardless of their pool.

Besides this idea of transaction fees being put aside, if the price of the collateral drops, the governance will also be able to adjust the fraction of transaction fees going to SLPs or to the surplus directly. By putting more of the transaction fees directly in the collateral (again, this means that it is money in the protocol that belongs to the contract and that is not redeemable by anyone), the protocol can be re-collateralized while not increasing claims on the collateral.

3.7.2 Governance Tokens Aside

The same mechanism as described for transaction fees will be put in place for the distribution of governance tokens.

As mentioned before, governance will also be able to adjust governance token distribution from one pool to another to incentivize SLPs to collateralize one pool with respect to another. For instance, if the price of one collateral drops significantly, in parallel to the governance tokens put aside, governance will be able to increase or decrease the share of the tokens that go to the SLPs contributing to this pool with respect to the SLPs in other pools.

HAs will normally not be receiving governance tokens. But in some cases where there are not enough HAs, the governance will be able to distribute governance tokens to HAs in some pools.

3.7.3 Restrictions to SLPs exit

When the collateral ratio drops because of a price drop (or because of an increase in the price of the stable asset), having LPs exiting and redeeming their collateral can have an accelerating effect in this collateral ratio drop. While it cannot be a solution to block HAs exits, a solution can be to limit SLPs exits, by introducing a slippage ratio depending on the collateral ratio.

The current design is a piecewise linear function, to make the risk predictable for SLPs while still incentivizing them to stay in the protocol. Also from the protocol perspective, continuous functions are desirable as it may limit front-running effects.

An example of implementation can be to put no slippage when the collateral ratio is larger than the targeted one denoted **target** (150%) and to make it 0 when the protocol hits a collateral ratio of 100%. The slippage function is hence:

$$\frac{\text{collateral ratio} - 1}{\text{target} - 1} 1_{\text{collateral ratio} < \text{target}} + 1_{\text{collateral ratio} \geq \text{target}}$$

This function (inferior to 1) will be multiplied to the number of `sanTokens` given by the SLP (and to the change rate between `sanTokens` and collateral) to know the corresponding amount of collateral that should be given.

One important thing to note and that helps the robustness of the protocol is that `sanTokens` and `aEUR` will be tradable on the open market. This means that a SLP willing to cash out could sell her `sanETH-EUR` tokens on a secondary exchange (like UniSwap) and hence get collateral without interacting with the protocol. Similarly, people willing to buy Angle's stablecoins may also do it on the open market and without interacting with the protocol. Again transaction fees are a good regulator of these interactions. Lowering these fees makes the protocol more attractive, and symmetrically increasing fees makes it less attractive.

3.7.4 The case of HAs

On the opposite, HAs are not entitled to the same restrictions as SLPs. In particular they are not affected by the slippage factor, meaning they can leave the protocol whenever they want. Thanks to this, they can serve to re-collateralize

the protocol at any point in time.

Indeed, the slippage used with SLPs can potentially deter new SLPs from coming in when the slippage is low, because they know that they will potentially not be able to get all their investment back when they want to. But with HAs having no exit restrictions (except the transaction fee depending on the time they have spent within the protocol), it is possible to see new collateral coming in even when the protocol is not enough collateralized. By entering when the protocol is not well collateralized, HAs can still get important rewards if the price of collateral increases between the time they came in and the time they came out. They are just long traders playing with the protocol which offers this option to leverage themselves.

The only restriction to HAs is again close to what was developed in 3.3. If the reserves are not enough to reimburse a HA willing to cash-out, the protocol will reimburse the maximum amount in the collateral associated to the position of the HA and the rest will be reimbursed in the `sanTokens` of the pair (stable asset, collateral) the HA committed to: HAs will be thus be converted to SLPs in this case. Note that the slippage may be equal to 1, as the protocol may be healthy but missing specific collateral. This event could be faced, for instance, when users burn massively one collateral. However, this restriction is an edge case, as it asks to empty an entire pool of collateral.

3.8 Governance Token Sale Mechanisms

Besides relying on LPs, other more traditional mechanisms can be used to re-collateralize in some cases, including mechanisms involving governance tokens (description of governance tokens in 3.13.4). At all times, some of the governance tokens (25%) of the protocol will be sold by the protocol at a price depending on the quantity that has already been sold before against stable assets. Burning stablecoins will serve as directly increasing the surplus of the protocol. A function will basically take into account what has already been issued according to this mechanism compared with what can be issued:

$$\text{price} = \frac{\text{start price}}{(1 - \frac{\text{tokens sold}}{\text{tokens to sell}})}$$

In case where the protocol is not well collateralized, governance will be able to change the parameters of this price model to make the sale of these tokens cheaper: potentially decreasing it below market price. This situation clearly incentivizes people to burn stablecoins against governance tokens. This mechanism is equivalent to Maker's Flop auctions when there is too much bad debt in the protocol.

If this 25% envelope has been completely used, and only in this case, governance will be able to vote to issue new tokens for this sale mechanism. This is however an edge case very unlikely to happen, so much that the total supply of governance tokens can be considered fixed.

3.9 Robustness of the Protocol in Case of Drops in Collateral Prices or in Collateral Ratio

3.9.1 Why Maintaining Collateralization is Harder than with Maker?

Unlike Maker, with Angle, it is harder to guarantee that the protocol will always be more than 100% collateralized. Maker has a liquidation feature, meaning that if the price of collateral drops rapidly, then vaults which are under-collateralized are put in auctions. The collateral in this vaults is sold against stablecoins to reimburse the debt of the vault. Since there is significant premium for buying the collateral, this ensures that there will always be people incentivized to bet on these auctions, and hence that the protocol remains collateralized enough.

In the case of Angle, there will not be such a feature: if the price of the collateral drops or if the price of the asset the protocol tries to peg surges, then there is a big risk that the protocol becomes under-collateralized.

As seen in the previous parts, it is important to make sure that the protocol will remain robust in all cases. Several remarks:

- LPs (both SLPs and HAs) are assumed by the Angle protocol to be risk takers. They should know when giving money to the protocol that they may not all get their money back, either for SLPs because the collateral ratio is too small or for HAs because they took a too risky position.
- Various collateral types will be accepted. With asset diversification, Angle is less prone to having the issue where one asset drops and affects the stability of the system.

3.9.2 Summary of the Possible Actions and Incentives to Manage Risk

In the paragraphs above were detailed some of the actions that could be taken to mitigate the impact of drops in collateral price. Let's summarize all the way Angle deals with its risks and potential price drops.

- A large part of this risk is assumed by HAs: if HAs cover exactly what has been brought by users at all times, then the risk is completely eliminated.
- The protocol will accumulate some surplus from transaction fees, collateral price increases and sales of governance tokens on which stakeholders of the protocol will have no claims. This will serve as a buffer to better deal with drops in collateral ratio.
- In case of price drops, Angle can increase the distribution of governance tokens to LPs in some targeted pools, which will make being a LP (a SLP or a HA) in the given pools more attractive.
- Governance can change the transactions fees to encourage burning or minting and therefore preserve the liquidity of the protocol.
- The protocol can put aside part of the transaction fees that should be earned by SLPs. These fees will only be recovered by SLPs once the pool becomes collateralized again.
- Angle can limit the collateral escape by restricting the SLPs exits to avoid an accentuating effect where collateral ratio decreases even more. HAs are not affected by such restrictions, and they can find incentives to enter at any point in time thus bringing extra-liquidity, regardless of whether there has been a price drop or not.
- Changing the parameters of the governance token sale as explained above is also an important tool that can be used to re-collateralize the protocol, and thus to support its reliability.

3.10 Emergency Shutdown

Even with the measures described above, it is however possible that the protocol remains too unstable or not enough reliable. With that in mind, a plan for emergency shutdown needs to be made. This action can be triggered by the governance in case of major security breach, cyber-attacks or a long term unstable position of the protocol.

Angle's emergency shutdown mechanism will always prioritize owners of stable assets (aEUR), while keeping in parameter the amount redeemable by the LPs.

The main risk with protocols with full convertibility is the risk of bank run. In economics, to avoid situations of bank runs, one solution is to eliminate the notion of sequentiality. By backwards induction, this dis-incentivizes people from rushing to be the first to be served, and thus it helps nip in the bud the risk of bank run.

The emergency shutdown mechanism has been designed to make sure that at no point in time there will be a sequentiality and that the first-arrived to redeem collateral will not be the first-served. It has also been thought to favor governance token holders, in order to create an upwards pressure on price in this situation, thus allowing for more effective governance token sales prior to that.

It will consist of the following phases:

1. Freeze protocol transactions and oracle prices.
2. Allow a time window (like 24 hours) for owners of aEUR to redeem the collateral of their choice (limited to the protocol's owned collateral).
3. After this time window, depending on the amount remaining in the protocol, if there is enough collateral for all, they will be all reimbursed. If not, stable holders which own governance tokens (i.e. for which the ratio between governance tokens owned and claim is superior to a threshold k) will be reimbursed first and receive a fraction of the remaining collateral depending on how many aEUR they had.
4. If there is collateral left, stable holders who do not have enough governance tokens will be reimbursed proportionally to what they have.
5. If there is collateral left (i.e. if all owners of aEUR who redeemed it have been fully reimbursed), then the protocol will let LPs (both SLPs and HAs) redeem what is owed to them: LPs will also have a time window to come to the protocol and ask to get reimbursed. The protocol will check the claims and in particular verify that HAs' claims are in accordance with the current state of their position.
6. In this situation again, governance token holders will first be favored. Those for which the ratio between governance tokens owned and claim is superior to a threshold k' will be reimbursed first proportionally to their claim.
7. If there is collateral remaining from there, it will be distributed to LPs which asked it proportionally to what is owed to them.

In case the protocol supports multiple stablecoins, the different stablecoins will function independently such that the pools for one stablecoin_{*i*} are entirely disjoint from pools of stablecoin_{*j*}. Therefore, emergency shutdown could be triggered for only one stablecoin or for all stablecoins depending on the cause which lead it to be triggered.

3.11 Generalization to Other Stablecoins

In what was presented so far, only the case of a single stablecoin minted by the protocol was introduced. Nonetheless, as mentioned in the abstract, Angle aims to be a protocol that lets users mint the synthetic pegged to the asset of their choice (among a whitelist of assets) with the collateral of their choice. To this extent, with Angle, it will not only be able to mint aEUR, but also other synthetics like aUSD or aCNY for example.

To keep the system resilient, the different stablecoins from the system will all be independent. This implies that the collateral pools for the various stablecoins will be different. If there are two stablecoins supported aEUR and aUSD, there will be two ETH collateral pools: one for the aEUR and one for the aUSD stablecoin.

The collateral ratios for stablecoins will be independent from each other. The only thing that will be common will be the governance tokens: the system will just have one governance token MUR used across all stablecoins.

3.12 Oracles

3.12.1 Solution

This may be subject to changes, but in the beginning, the protocol will need to rely on a centralized set of oracles which will be compared to the UniSwap Time-weighted average of some pools like USDC/ETH.

It is the goal of the Angle Labs core team to push for decentralization and thus for decentralized oracles, like Chainlink which is as it stands too expensive to be used at inception by the protocol. The protocol could also read price fees from other oracles like Compound or Synthetix.

3.12.2 Avoiding Oracle Front-Running Risks

With the full convertibility the protocol proposes, there is an important front running risk. If a user trades to take advantage of latency between prices detectable in the off-chain market that will be pushed on-chain and the current on-chain one, then they make profit at the expense of the the protocol, and surplus is basically taken from the protocol.

Eliminating front-running risks still remain an open question. Synthetix has faced this issue, and got arbitrated by bots before taking solutions which to date are still incomplete.

The solution that may be implemented in the beginning consists in separating each swap transaction (between stable assets and collateral and conversely) into two transactions: one push transaction where the user gives collateral and one pull transaction where the user can get her stable assets based on an oracle value she was unaware of at the time she pushed her transaction. Pull transaction could for instance be executed 20 minutes after the push transaction at the oracle price observed 10 minutes after the push transaction.

This clearly reduces the user experience, and may harm a bit arbitrageurs which help maintain peg of the stable assets, but this completely eliminates the front running risk. Other incomplete solutions like preventing transactions with gas prices which are too high or putting a slippage when transactions are getting too big and could correspond to such front-running transactions could be used if this first solution ends up being abandoned.

3.13 Governance of the Angle Protocol

3.13.1 Automation

The goal at Angle is to minimize governance. Ideally, Angle will be a self-running machine which does not need any human input other than oracles and which will work completely algorithmically.

In the beginning however, given how all the protocol's parameters will have to be set manually without really knowing what could be their optimal values, the protocol will still require governance.

Elements that Angle would like to automate in the long term include:

- Governance token distribution across the various collateral pools for each stablecoin. As explained in more details above, the collateral pools for the various stablecoins will be independent, meaning you could be a SLP in the ETH pool for the aEUR stablecoin but not a SLP in the ETH pool for the aUSD stablecoin. Among all the governance tokens that will be distributed to SLPs of the protocol, in the beginning, it will be the role of governance to decide which collateral pool will receive which share of the tokens. Ideally, this could be automated based on the collateral ratio of each pool to incentivize SLPs to re-collateralize at risk pools.
- Parameters of the piecewise linear functions for the transaction fees and the slippage.
- Lending bounds to each lending protocol: how much of the reserves should be lent to Compound and to Aave.

3.13.2 Design

The way governance votes will take place will be forked from Compound's current design. This is the solution adopted for the moment, but this may well change before launch.

3.13.3 Advantages for Governance Token Holders

In addition to the right to take part to governance votes or to being settled first in case of emergency shutdown, governance token holders also enjoy some advantages with the protocol.

After a large increase in collateral price with respect to the asset the protocol is pegging its stablecoin to, it is possible that the protocol has some surplus. This can happen for example if the protocol received 10 ETH from users worth 100€ and if these 10 ETH are now worth 1000€. Without HAs, the protocol has a 900€ surplus.

This surplus can be used as a buffer for future price drops, but it can also be used for auctions where governance tokens can be burnt against surplus like Maker does. It would be the role of governance to vote for when and how much should be placed on auctions. Angle expects governance not to put amounts on auctions that could potentially harm the robustness of the protocol.

3.13.4 Governance Token Distribution

The total supply will be 1 billion tokens. There could potentially be more tokens issued in case where one stablecoin is at risk (edge case), or some tokens burnt if the protocol has a too big surplus.

The planned governance tokens distribution will be as follows:

- 31% will go to Angle Labs' team and investors
 - 13% will be used for token sales to investors and angels, with a first token sale of 5% of the tokens. There will be a vesting for these tokens, with 25% available immediately (to create liquidity), and then 25% unlocked each year, meaning that vesting will last for three years.
 - 18% will go for Angle Labs Core Team and employees. There will be a vesting for these tokens, even for the founders of Angle to make sure that they remain fully committed to the protocol and the community.
- 2%: For advisors, grants, people in the community who help Angle. These tokens will be owned and controlled by Angle Labs.
- 40% will be used for distribution to SLPs (in majority), users (in the beginning) and HAs (in some cases). Like Compound, this fixed quantity of tokens will be distributed for a period of 4 years, but at a rate that can be modified by governance. Distribution will for example be made faster in the first year to drive usage. Tokens will be given through staking contracts meaning that each token when distributed will be available immediately to its owner without vesting.
- 25% will be put aside to be sold automatically to the protocol. As explained above, people will have the ability to buy tokens to the protocol at a price depending on the number of tokens that have already been minted. Whenever the market price of the tokens will be superior to that proposed by the protocol, people will be incentivized to buy to the protocol. The goal is that the money received will serve as a surplus to the protocol.
- 2% is left aside for future protocol incentive.

In the end, no token will be owned by Angle Labs, Inc.

3.14 Launch Strategy

At first, Angle will start by proposing Dollar and Euro stablecoins. Because of the lack of competitors in these markets, Euro is believed to be a good starting point. Besides, the need for a Euro stablecoin is the reason for which the project was initiated.

To bootstrap each stablecoin, SLPs will be the first allowed to come in, then both HAs and users will be able to get in at the same time. This is a way to make sure that stablecoins will start by being over-collateralized.

Angle will allow users, for the genesis, to place their stablecoins in a contract that will offer governance tokens. This aims to give users even more incentives to interact with the protocol, which will in turn encourage LPs to also interact with the protocol.

The overall idea is to begin with aEUR and aUSD backed by USD stable assets like DAI or USDC and volatile collateral like ETH. It will stress test the protocol and help make sure that it is robust to small deviations in collateral or in pegged asset price which could affect the reliability of the protocol.

Angle will diversify its position on the market by accepting different collaterals, such as wBTC if the project launches on the Ethereum blockchain. Assets diversification will allow the protocol to better hedge against price drop of one of the collaterals. This will allow Angle to always keep a quite stable Euro or Dollar value in reserve.

The end goal of Angle Labs core team and hopefully of the community is to bring the Forex and stock market on-chain. It is possible with the protocol, provided that there is an oracle, to innovate and explore new verticals of stablecoins, like stablecoins pegged to the temperature in Paris.

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