DEPO Finance - DEPOF

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Abstract

DEPO Finance (DEPOF) aims to build a store of value crypto currency that encourages holders and discour-ages sellers. Holders may also stake their tokens in staking contract and get rewards.

DEPOF rewards holders and dampens selling pressure through price action feedback mechanisms. When the token price appreciates, token holders receive staking rewards based on several factors including the percentage price increase, how long they have been holding for and how many tokens they hold. Rewards are distributed on a daily basis.

When the latest prices have been updated, stakers are rewarded. Internally, this calls the smart contract function that determines how much you are owed based on the price change and other factors such as how long you have been holding for.

HODLers are incentivized to keep HODLing, and sellers pay high fees and lose future staking rewards when they don't HODL. DEPOF is deflationary. Holders get rewards when price increases for at least 3 consecutive days and by at least 2%. DEX sellers incur a burn of 5%. This mechanism encourages holding the DEPOF token and discourages sales.

When the token price appreciates, token holders receive staking rewards based on several factors including the percentage price increase, how long they have been holding for and how many tokens they hold. Rewards are distributed on a daily basis. If the token price is not appreciated, no rewards are minted.

DEPOF is inspired by elastic supply DeFi projects, such as Ampleforth. What differentiates DEPOF from other similar systems is in future technical development and tar-geted markets. DEPOF will implement a Cosmos SDK based application specific

blockchain. After launching the Cosmos based application specific blockchain, DEPOF will join the Cosmos ecosystem to provide a price action based store of value cryptocurrency.

Figure 1: DEPO Finance - https://DEPO.finance

1. Price Action Feedback Loop

Price action feedback loop is the ability to adjust token supply relative to price action of the token. The protocol defined in this paper, called the Depo Finance (DEPOF), is a price feedback cryptocurrency. Price feedback is an important feature because it creates adequate supply to react to demand spikes as the result of large amounts of liquidity entering or exiting

the system. The goal is to lower volatility in the short-term, and foster the currency to behave as a store-of-value in the long term.

The protocol is initially implemented on the Ethereum network. Due to the immutability nature of the Ethereum blockchain, real time dynamic adjustment of the supply base is difficult. The current implementation calls for price change in percentages being entered in the staking contract, and holders interact with the contract to update their supply relative to the price change.

Holders have a vested interest to interact with the staking contract to update their token holding. On days that the price does not increase, no readjustments are available to be claimed. This mechanism limits inflation to increased overall demand only. In addition, sales of DEPOF are subject to burn fees. This introduces a deflationary pressure on the network, which reduces the impact that the inflation has. The aim is to keep the inflation and deflation rates close, but we concede that the currency will be slightly inflationary, because we provide incentives for holding for long periods of time. These incentives are discussed in the section below.

2. Incentive Structure

While price action feedback is a principal feature of the protocol, one cannot ignore the importance of a balanced incentive structure when designing a decentralized cryptocurrency system. The Depo Finance (DEPOF) incentive structure ties itself into the price action feedback by increasing the supply adjustments for long-term holders, thereby reducing token velocity. That is, the longer a given token holder holds, the greater their rewards are on price-positive days. Note that the terms ‘supply adjustment’

and ‘reward’ are interchangeable as they both refer to the protocol’s ability to increase its supply. In addition, we call holding the token for long periods of time ‘staking.’

$$tokens = balance * \frac{numerator\ of\ percent\ change * days\ staked}{denominator\ of\ percent\ change * inflation\ adjustment\ factor}$$

Figure 2: Rewards formula [3]

The above formula is used to calculate the owed supply adjustment for a given holder on a given day. Notice that the ‘days staked’ variable acts as a positive multiplier on the user’s daily owed rewards. The ‘days staked’ multi-plier begins immediately when the buyer receives tokens in a new address and is reset when any amount of tokens are moved from that address, but does not change when rewards are claimed (which allows for compound interest). It is manifested in the smart contract as a Unix timestamp taken from the block in which the original transaction occurred. This multiplier gives a strong incentive for users for buy and hold, temporarily removing tokens from the total supply until demand spikes again and holders might choose to forgo future rewards to lower the volatility. The intention with this incentive is to lower token velocity and thereby increase the intrinsic value of the network [1].

The inflation adjustment factor is a variable that allows the team behind the development of the implementation to adjust the inflation rate if it gets out of hand. This is initially necessary because projecting the actual inflation rate is difficult without knowing the price action in advance. If the token increases in value rapidly, the inflation rate might quickly spin out of control; thus, the infla-tion adjustment factor introduces a mechanism to limit inflation. The current inflation adjustment factor is set to 600. This appears to be a good number, and in future releases the number will become static so as not to introduce cen-tralization or subjectivity into the protocol.

Now, suppose an individual purchases 10 DEPOF tokens and holds them for 30 days. He then increases his balance to 12 DEPOF. Certainly, he has not been holding 12 tokens for 30 days - he has only been holding 10 of them for 30 days. This is an issue that is solved by decreasing a user’s staking time when they receive tokens based on the number of tokens received as a percentage of the user’s total balance.

$$seconds = 1000000 * \frac{amount\ received}{current\ balance}$$

Figure 3: Staking time reduction formula [3]

This allows users to receive new tokens while still maintaining their days staked multiplier, without allowing abuse of the rewards structure. Using the above formula, if a user receives 9% of their current balance, their ‘staking time’ is reduced by 90,000 seconds, or 25 hours, and 5% is about 13 hours. In the next release of the staking contract, this penalty will be reduced by half. If a user wishes to accumulate tokens over a period of time and still participate in the rewards, it is evidently wise to have multiple wallets - at least three is recommended.

Another incentive to hold tokens for long periods of time is Holder’s Day, which is one day each month that holders of 30 days or more in staking time receive a bump in rewards regardless of price action for the day.

$$tokens = current\ balance * \frac{days\ staked}{600}$$

Figure 4: Holder’s Day reward formula [3]

According to the formula, on this day a holder of 30 days receives a 5% reward and a holder of 60 days receives a 10% reward. This creates an incentive for long-term holders to continue staking even if the price is negative for an extended period of time. Note that it is not possible to have a reward of greater than 10% on any given day.

Volume across exchanges is important for a healthy project. Generally, when the price of a coin or stock increases with low volume, the price action is not considered very bullish. To ensure that an increase in price is indeed due to an increase in demand and not due to low liquidity or high spread, our smart contract imposes some volume requirements for rewards. This requirement uses a market-cap-to-volume ratio.

$$ratio = \frac{market\ cap}{volume}$$

Figure 5: Market cap to volume ratio [3]

In smart contract-land, there is no way to properly measure the ‘circulating supply’ and the ‘total supply’ — there is just the total token supply. To account for this, we have decreased the volume requirement with respect to market cap for the market cap calculated using the total token supply. In order for streaks to count, the daily volume must be at least 4% of the market cap, when calculating using total supply, or 10% of the market cap, when calculating using circulating supply. Normally a streak decreases the inflation adjustment factor by a factor of the number of days in the streak, but if the volume is less than 4% or 10%, respectively, the streak does not count. In addition, if the volume is less than 2% of the market cap when using total supply or 5% when using circulating supply, the inflation adjustment factor is increased by a factor of ten, dramatically reducing rewards.

3. Liquidity Staking

While allowing the token supply to adjust relative to market demand is good for volatility, it is arguably useless without market liquidity. Because the protocol implementation restrictions require a smart contract interaction to adjust each holder’s respective balance, there is no incentive to keep liquidity locked in an exchange due to dilution. We counteract this misaligned incentive by rewarding users who provide Uniswap exchange liquidity, and we do this via liquidity tokens. Uniswap liquidity tokens are ERC20-compliant tokens that represent a share in the Uniswap liquidity pool for a given Uniswap asset pair (in our case, this is the ETH-DEPOF pair). Liquidity tokens are minted when liquidity is provided and burned when liquidity is removed. Thus, the percentage of a user’s liquidity tokens relative to the total supply of liquidity tokens is equivalent to the percentage of the user’s balance in the pool relative to the total balance in the pool. This is applicable to both assets, which in this case is Ethereum (ETH) and Depo Finance (DEPOF).

$$total\ tokens\ owed\ = (days\ staked * reward\ adjustment\ factor) * \frac{UNI\text{-}V2\ balance}{UNI\text{-}V2\ total\ supply}$$

Figure 6: Liquidity staking rewards formula[3]

The above formula is used to calculate the owed rewards in DEPOF tokens for a given balance of liquidity tokens and amount of days those tokens were staked. Note that claiming liquidity staking rewards will reset the amount of days the liquidity tokens were staked, which in turn means that the rewards from liquidity staking are not meant to be claimed daily. The user can choose to claim their reward and withdraw their liquidity tokens whenever they would like. It is recommended to enforce a minimum stake duration so that liquidity is not being removed and added frequently as consistency in the amount of liq-uidity on the exchange is important. The implementation requires a minimum of 2 days before liquidity and rewards can be removed and claimed, respectively. The total supply is not a constant figure, so similarly to price-reactive staking, it is difficult to predict future liquidity staking rewards.

The reward adjustment factor allows for the control of the amount of rewards that are available to liquidity stakers. This is another mechanism to control inflation on the network, and will be removed in a future release. The current reward adjustment factor for liquidity staking is 5 ↤ 1021.

4. Price Oracle

Decentralized systems often require access to external data. This protocol, for instance, requires access to accurate market data so it can adjust its inflation rate accordingly. Ethereum does not have a built-in mechanism by which data can be retrieved, so in order to update market data, an external function call must be used that supplies the contract with the relevant data. The first im-plementation uses an external script that queries cryptocurrency tracking web-site CoinGecko several times per day, and then averages the price and percent change to come to a proper conclusion of the price action throughout the day. The script then pushes the averaged market data to the smart contract only if the price is positive (to save on gas fees).

In a future release, the implementation should use a decentralized external data source (Oracle) that publishes the price movements. A decentralized oracle is necessary because it removes the trust placed on the development team to record and publish the price properly. Ideally, this Oracle will average the price movements throughout the day

using price history and only publish if the average percent change is positive - but this might not all be possible. The implementation plans to use the Chainlink network as the price oracle because its threshold signature approach makes it sufficiently decentralized for our use case [2]. In addition, the Chainlink network aims to be blockchain agnostic [4], meaning we can continue using it in future implementations on different blockchains (explained further below).

5. Future Work

Building our protocol on Ethereum allows us to make use of the myriad of other decentralized finance applications that exist in the Ethereum ecosystem, such as decentralized exchanges like Uniswap [5] and loaning protocols like Compound

The Depo Finance (DEPOF) protocol can be used as a financial instrument and a hedge during a market downturn (due to the deflationary burning mechanic), which makes it a good candidate for lending platforms. However, Ethereum also brings with it some serious constraints - for example, supply updates must be claimed by users individually, because it is infeasible to update the balances of every user recursively due to the block gas limit (and this would be prohibitively expensive, in any case). This constraint requires users to spend gas fees to claim rewards, which is bad user experience design. One could argue that the gas fees are traded for tokens, so users are effectively converting their Ethereum into tokens when claiming, but this gas cost does not scale with the number of tokens that are being claimed, and the protocol works best if there is no barrier to inflation adjustments.

Ethereum is also quite limited in terms of throughput, meaning that in its cur-rent form it cannot meet the sheer scale necessary to run financial applications for the entire world. This means that our protocol ought to be blockchain-agnostic, so that it can easily be ported to other blockchains that have less throughput limitations. We identify the Cosmos network as a good contender for the next implementation of the protocol as it allows for cross-chain interoper-ability, so staking can be done on many different chains which allows for greater usability. Cosmos also provides exceptionally higher throughput and provable finality via the Tendermint consensus mechanism [6], which is incredibly useful as it allows the Depo Finance (DEPOF) protocol to adjust itself much quicker than it can on Ethereum. With Cosmos, it’s possible that supply adjustments could take place every hour, for example, and individual stakers would not have to perform any

contract interaction for their balances to update - in fact, they would not even have to be staking on the same chain.

6. Conclusion

In this paper we presented the Depo Finance (DEPOF), a protocol for a price-reactive cryptocurrency. The protocol uses a price oracle to retrieve market data which allows it to adjust its inflation rate accordingly. The protocol's ability to in-crease its supply allows it to better respond to changes in market demand than many other cryptocurrencies. In addition, the protocol uses a novel incentive structure to incentivize certain behaviors that decrease token velocity which improves network value. We also introduced a mechanism by which Uniswap liquidity tokens can be staked in order to incentivize decentralized exchange liquidity pooling. Finally, we discussed our plans for future work, including the integration of the decentralized oracle network Chainlink to remove trust in the pricing process, and an implementation atop a high-throughput base chain like the Polkadot network for better granularity in price action feedback, and better user experience and incentive design. We believe that our protocol will pave the way for future experiments in decentralized price-reactive financial protocols.

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