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A protocol to synthesize proof-of-work assets

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Abstract. Synthetic asset protocols have repeatedly demonstrated an inability to maintain price pegs. This is particularly the case when prices of synthetics drop and are lower than their non-synthetic counterparts. This whitepaper proposes τ, a protocol to harness proof-of-work mining to synthetize new assets. By using the mining process, the τ protocol creates synthetic crypto assets with provable backing and strong mechanisms to restore price pegs.

1 Introduction

Proof-of-work ("PoW") cryptocurrencies are storing significant amounts of value. At the time of this writing, the market capitalization of Bitcoin alone is about $1 trillion US dollars. Most PoW blockchains, however, have limited support for decentralized finance ("DeFi"). A gap therefore exists between DeFi as a set of nascent financial protocols and PoW assets as the primary value stores for cryptocurrencies.

Wrapping can ferry PoW cryptocurrencies into DeFi. Nonetheless, the trust models from "wrapped" frameworks all introduce an intermediary with a new attack surface. Trustworthy centralized custodians are rare and often involve onerous restrictions. Non-custodial synthetic cryptocurrencies consequently surface as a potential solution. These synthetic assets purport to serve as substitutes for PoW assets by maintaining price pegs with their non-synthetic counterparts. In other words, the strength of the pegs determines the efficacy of a synthetic asset.

Empirical evidence from projects that include prominent algorithmic stablecoins has shown the peg to be weak for the current generation of non-custodial synthetic cryptocurrencies. The reason for pegging failure appears to be these synthetics' lack of value support from outside of their systems such that internal pegging

mechanisms become irrelevant when users lose confidence in the systems in their entireties.

We propose the τ protocol to solve this problem. The τ protocol synthesizes the *process* through which PoW cryptocurrencies are mined and introduces external value support as part of its price pegging mechanism. PoW cryptocurrencies synthesized through the τ protocol should demonstrate strong price pegs and form reliable basis for DeFi products.

2 Fragility in Current Designs

Current generation of non-custodial synthetic cryptocurrencies largely rely on the rebase model or the arbitrage model to attempt price pegs. Both models have shown susceptibility to unrecoverable breakage when the price of synthetic assets are below what they should peg with (e.g., relative price lower than 1.0 as determined by reliable oracle sources).

Under the rebase model, a synthetic cryptocurrency would react to the occurrence of a relative price lower than 1.0 by proportionately reducing the balances of all addresses holding the cryptocurrency. The extent of the reduction depends on how much the relative price deviates from 1.0. The thesis is that the contraction would shift the supply curve to the left, thereby creating a pressure for the relative price to return to 1.0.

The arbitrage model avoids direct tempering with account balances. Instead, through a single component or a combination of many, a synthetic cryptocurrency relying on the arbitrage model would issue instruments priced in the cryptocurrency. These instruments promise to return a higher amount of cryptocurrency than the price paid when the relative price has returned to 1.0. The thesis is that arbitrage opportunity presented by these instruments would entice holders to lock up their holdings in these instruments, which would in turn contract total supply and push the relative price to return to 1.0.

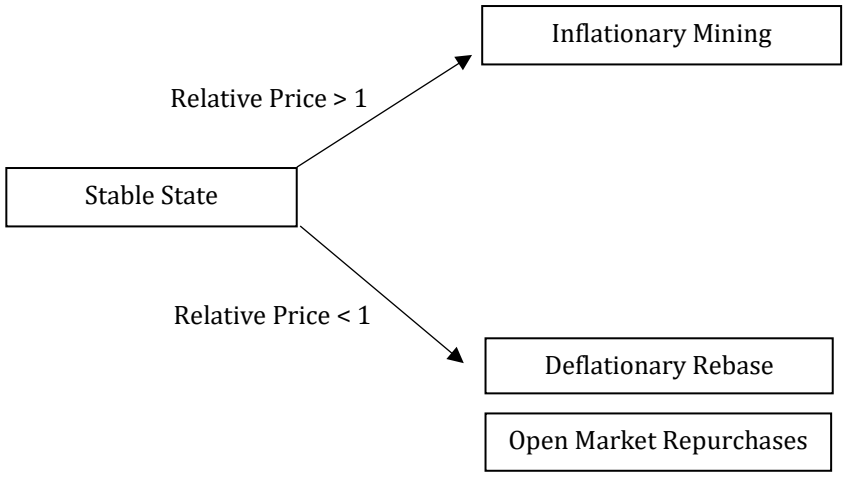
The long-term viability of both models is yet to be validated. There are already, however, examples from each model that have failed real-world stress tests. For failed rebase projects, users interpret balance reduction not as a sign that relative price will soon increase, but as a negative event compounding the price drop, causing a “death spiral “of selling that further pushed the price down. For failed arbitrage projects, the promise to give back in the future more cryptocurrencies that was already depreciating proved to be inadequate incentives. Users disregarded the promises and continued to sell.

Both models construct microcosms in which sets of rules designed to encourage price pegs operate. These rules are entirely internal to their microcosms, such that when users doubt the microcosms for a lack of inherent value, how and why these internal rules would function become irrelevant. This shared trait likely explains these models' propensity to fail.

Mechanisms to demonstrate inherent value in the synthetics and to introduce external value support during times of stress are therefore necessary for a sustainable asset synthesis protocol. The τ protocol achieves both.

3 The τ Protocol

The τ protocol describes how PoW cryptocurrencies can be reliably synthesized for further use or composition by DeFi instruments. We refer to PoW cryptocurrencies synthesized by the τ protocol as τAssets. To ensure τAssets have inherent value, the τ protocol requires consumption of hashrate during synthesis. In other words, the τ protocol does not synthesize PoW cryptocurrencies directly. It synthesizes the mining process, which imparts inherent value to PoW assets in general. And to restore the price pegs when the relative price is lower than 1.0, the τ protocol uses a combination of deflationary rebasing and open-market purchases to improve effectiveness.



4 Synthetic Mining

The τ protocol utilizes hashrate tokens to synthesize the mining process. Hashrate tokens are cryptocurrencies collateralized by standardized and tokenized PoW hashrate. Staking hashrate tokens would entitle the staking holder to a share of the mining rewards earned by the underlying PoW hashrate.

To synthesize a τAssets, the τ protocol requires the staking of hashrate tokens collateralized by the relevant PoW hashrate and the forgoing of PoW rewards in return for the synthetic versions. For example, synthesis of τBitcoin would require synthetic mining with hashrate tokens collateralized by standardized Bitcoin hashrate. The combination of staking with the relevant PoW hashrate and the surrendering of PoW rewards represent hashrate consumption, imparting inherent value into the resultant synthetics.

The forgone mining rewards will be reserved for open market repurchases of τAssets, if necessary, as discussed below.

5 Inflationary Mining

When the relative price of a τAsset is greater than 1.0 (determined daily as the average relative price of the previous day), the τ protocol would adjust the synthetic difficulty such that additional units of the τAsset become minable through synthetic mining. The greater the price deviation is, the stronger the adjustment would be. Inflationary synthetic mining will continue until the increase in total supply restores the relative price of the τAsset to 1.0.

A special case is the launch period of a τAsset. Because the initial supply of a τAsset is zero, there is no relative price available to determine synthetic difficulty with. To solve this issue and as a convention, the inflationary mining mechanism will be paused during the first eight weeks of a τAsset's launch. During this initial period, a fixed amount of τAsset consisting of initial circulation should be minable regardless of the relative price. The initial circulation amount for a τAsset should be proportionate to the percentage of blockchain-wide PoW hashrate represented by the relevant hashrate tokens to avoid acute deflationary pressure.

6 Deflationary Rebase and Repurchases

When the relative price of a τAsset is lower than 1.0 (determined daily as the average relative price of the previous day), the τ protocol would initiate a

deflationary rebase. The greater the price deviation is, the stronger the rebase would be. At the end of the rebase, the balances of all addresses holding the τAsset would have been proportionately reduced.

At the same time and in addition to the deflationary rebase, the τ protocol would initiate open market repurchases of the τAsset with mining rewards forgone by staking holders during synthetic mining. The repurchased τAsset will be burnt to reduce the circulating amount, thereby inducing the relative price to return to 1.0. This is a key improvement of the τ protocol over a pure rebase model for the open market repurchases introduce external value support for τAssets.

7 Conclusions

The τ protocol uses the unique trait of hashrate tokens to impart inherent value into τAssets. It also activates a combination of synthetic mining, deflationary rebase and open market repurchases to restore the relative price of τAssets to 1.0. Because τAssets have both inherent values and external value support, they should achieve stronger price pegs than the current generation of synthetic PoW cryptocurrencies.