

# hodlCoin: A Financial Game

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## I. INTRODUCTION

The hodlCoin game is a competitive zero-sum massively multiplayer financial game where the goal is to *hodl* an asset for long periods of time. By hodling, a player deposits *coins* of a given asset in a common reserve and receives a proportional amount of *hodlCoins*. Players who *un-hodl* pay a fee that is accumulated in the common reserve. Thus, the longer a player hodls, in comparison with other players, the more the player will benefit from fees paid by the players who are un-hodling earlier. Surprisingly, we prove here that, thanks to the accumulation of fees, the price of hodlCoins in comparison with the underlying asset never decreases!

## II. THE HODLCOIN GAME

The game's state is a pair  $(R, S)$  where:

- $R$  is the number of coins in the reserve,
- $S$  is the supply of hodlCoins.

The *price* of a hodlCoin is:

$$P(R, S) = \frac{R}{S} \quad (1)$$

The user can perform 2 actions:

- 1) **hodl**: The user deposits  $n$  coins into the game's reserve, and the game mints and gives the user  $\frac{n}{P(R, S)}$  hodlCoins.
- 2) **un-hodl**: The user gives back  $n$  hodlCoins to the game, and the game burns them and gives the user  $n(1 - \Phi)P(R, S)$  coins, where  $\Phi$  is a *fee* such that  $0 < \Phi < 1$ .

The game is assumed to be initialized with  $R = 1$  and  $S = 1$  and the *un-hodl* action is disallowed if it would result in  $S = 0$ . This guarantees that  $P(R, S)$  is initially equal to 1 and is always well-defined.

## III. RELATED WORK

hodlCoins are like reserveCoins in Djed/SigmaUSD [1], [2] without stablecoins. The *hodl* action is the *buy reserveCoin* action and the *un-hodl* action is the *sell reserveCoin*, except that:

- 1) The fees are different. Whereas in Djed/SigmaUSD, the user has to pay a fee when executing any of the two actions. In hodlCoin, the user only has to pay a fee when executing the *un-hodl* action.
- 2) Whereas in Djed/SigmaUSD the *buy reserveCoin* action is disallowed when the reserve ratio is above the maximum reserve ratio threshold, there is no restriction for the *hodl* action in hodlCoin.

Therefore, hodlCoin can be quickly implemented by forking SigmaUSD's contracts, backend and frontend, removing any

code related to SigUSD from them and adjusting the fees for the two remaining actions.

## IV. THEOREMS

**Theorem 1** (Never-Decreasing Price). *The price of hodlCoins never decreases: for any sequence of actions  $a_1, \dots, a_k$ ,  $P_k \geq P_0$ , where  $P_0$  and  $P_k$  are the prices, respectively, before and after the sequence of actions.*

*Proof.* Proof by induction:

- Base case (to prove  $P_k \geq P_0$  when  $k = 0$ ): In this case,  $P_k = P_0$ , trivially.
- Induction case (to prove that  $P_{k+1} \geq P_0$ , assuming, by induction hypothesis, that  $P_k \geq P_0$ . Let  $R_k$  and  $S_k$  be  $R$  and  $S$  after action  $a_k$ . Proof by case analysis:
  - Case  $a_{k+1}$  is a *hodl* action: Let  $n$  be the amount of coins deposited by the user. Then  $R_{k+1} = R_k + n = R_k(1 + \frac{n}{R_k})$  and  $S_{k+1} = S_k + \frac{n}{P_k} = S_k + \frac{nS_k}{R_k} = S_k(1 + \frac{n}{R_k})$ . Therefore,  $P_{k+1} = \frac{R_{k+1}}{S_{k+1}} = P_k$ .
  - Case  $a_{k+1}$  is a *un-hodl* action: Let  $n$  be the amount of hodlCoins given back by the user. Then  $R_{k+1} = R_k - n(1 - \Phi)P_k = R_k - nP_k + n\Phi P_k$  and  $S_{k+1} = S_k - n$ . Hence,  $P_{k+1} = \frac{R_{k+1}}{S_{k+1}} = \frac{R_k - nP_k + n\Phi P_k}{S_k - n} = \frac{R_k}{S_k} \frac{1 - \frac{n}{S_k} + \frac{n\Phi}{S_k}}{1 - \frac{n}{S_k}} = P_k \frac{1 - \frac{n}{S_k} + \frac{n\Phi}{S_k}}{1 - \frac{n}{S_k}}$ . Since  $n \leq S_k$  and  $\Phi > 0$ ,  $\frac{1 - \frac{n}{S_k} + \frac{n\Phi}{S_k}}{1 - \frac{n}{S_k}} > 1$ . Therefore,  $P_{k+1} > P_k$ .  $\square$

## V. DISCUSSION

The hodlCoin game can be seen as a **dual** of a Ponzi scheme. Whereas in a Ponzi scheme investors who enter earlier are paid with money from investors who enter later, in the hodlCoin game players who exit later are paid with money from players who exit earlier. Furthermore, whereas a ponzi scheme fools investors who are unaware of the scheme's operations, the hodlCoin game is **fully transparent**, its rules are clear and players are aware of them. Finally, whereas a Ponzi scheme is unstable and invariably leads to collapse, hodlCoin is conjectured to enjoy a self-stabilizing effect: if the price of the underlying asset is falling and players start to un-hodl to sell the underlying asset, this may encourage other players to hodl to benefit from the fees paid by those who are un-hodling; this may reduce the selling pressure on the underlying asset.

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## REFERENCES

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