Zeny, a value-redeemable price system

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1 Value-redeemable private money

Suppose a group of tomato vendors agreed upon selling tomato receipts, such that every tomato receipt can be redeemed for *one dollar worth of tomato* at any future time t_f. A tomato receipt entrusted by the group can be bought for x wei, worth one dollar at any given time t_{f-x}.

The design of the system considers three simple assumptions,
a. Price of producing a tomato remains the same, thereby ensuring price stability of tomatoes in dollars.
b. Price of wei is liable to change unpredictably.
c. Tomato receipts and wei have properties superior than the dollars.

A buyer buys one tomato receipt at time t_b. The price of one tomato at time t_b is 1 wei. The derived price of one tomato receipt would also be 1 wei. Now at time t_{b+2} the buyer wants to redeem his share of tomatoes. The price of one tomato at a time t_{b+2} rises to 2 wei. At time t_{b+2}, the buyers manage to redeem their fair share for one dollar worth of tomato per receipt. Instead, if a buyer had continued to hold wei, their purchasing power would drop by a factor of 2 at time t_{b+2} in comparison with time t_b. Irrespective of the fluctuation in wei price, the buyer was relieved from the burden of volatility.

The above price system shuffles between three different currencies;
a. Dollar
b. Tomato receipt
c. Wei

Wei has n superior properties than a dollar, but lacks stability. Tomato receipt has n-4 superior properties than a dollar, but facilitates stability in terms of tomatoes (value-backed). A dollar is stable but lacks certain properties.

The above scheme is completely naive but conveys the point of commodity-backed money, ex. gold standard. Commodity-backed money fails when the demand for money surpasses the possibility of acquiring backed-commodity to maintain 1:1 ratio. To serve the global economy, an authority would need to acquire ∞ quantity of gold. This argument also holds perfectly for any private money backed by government money. The major flaw apart from the concerns raised above involves entrusting the centralized authority reserving the commodity.

In case of the tomato-stable receipt scenario, a vendor loses deposit upon refusing to give a fair-share of tomato to any of the buyers. The network of vendors alleviates the trust of a single entity. New vendors can be part of the network for a small deposit fee improving and strengthening the tomato-stable receipt network.

To model such private money, it is critical to understand why government-issued money may have value?
a. Trust-enforced: Issued by an authoritative entity.
b. Utility-redeemable: Utility involves strictly paying taxes in government-issued money.

Usage of smart-contracts replaces an authoritative entity effectively satisfying condition a. Ethereum solves the utility-redeemable concern of condition b. The utility arrives from the mandatory need of ether as gas for usage of, Ethereum Virtual Machine. The price of ether is liable to change unpredictably because of speculative markets. Ether has an intrinsic value similar to gold but lacks extrinsic enforcement similar to fixed-rate defined by the government for gold-backed currency. The *real-valued stable private money* must possess both intrinsic and extrinsic attributes.

We leverage the utility provided by Ethereum and morph ether to zeny, a shadow-ether. The goal of each zeny involves maintaining an equilibrium with 1.54 dollars worth of gas for all future time $t_{f+\infty}$. To serve a growing economy, each zeny can be value-redeemable for execution time in ethereum universe U_E. Assuming ethereum universe U_E maintains utility value for all future time $t_{f+\infty}$, the time within the universe has continual demand. Coupling one zeny with on-chain execution time allows to reserve executions (backed-asset) without centralization need.

Zeny achieves the goal by,
a. Adjusting the circulating quantity of money in response to price changes.
b. Leveraging Casper consensus protocol by the network of Zeny-Ethereum stakers (tomato vendors) to back utility of each zeny.

2 Reserve-based reward mechanism

By increasing and contracting the circulating supply, zeny enforces equilibrium with 1.54 dollars. Reserves incentivize contraction of the circulating supply by *lucrative reward rates* on reserves. The rate of reward on reserve directly co-relates to the rate needed to achieve price stability from $price_t < 1.54$ dollars at given time t.

Zeny holders can reserve X zenies at R rate of reward for any time t_r, $t_r > 90days$. The cumulative reward received on the zeny reserve is the inflation rate of the system.

Situation 1: Price of one zeny drops below 1.54 dollars
A new reward rate on reserve is calculated to incentivize zeny holders to reserve their zenies for any time t. The rate continues to increase further with the drop in the price of zenies. One default zeny would be worth (number of ethers in reserve / number of zenies in total supply) ethers. Assuming the ethereum network have utility value, the bottom line of one zeny would always co-relate with the value of Ethereum network.

Situation 2: Price of one zeny rises above 1.54 dollars
The authoritative smart-contract maintains sale of zenies worth 1.54 + $X\%$ dollars each. If the market price of every zeny rises, new zeny holders can choose to purchase from the smart contract. The amount of zenies sold by authoritative smart-contract is limited. Once the smart-contract supply is exhausted, new zenies can only circulate into the system by reserve rewards.

Reserves provide a guarantee of reward every time interval t_i. As the price continues to drop, the risk to reserve continues to be low with a potential for higher reward.

3 Zeny-Ethereum stakers

The network of Zeny-Ethereum stakers are analogous to proof-of-stake Ethereum miners. The authoritative smart-contract maintains the global pool of ethers R_E supporting each zeny. Zeny-Ethereum stakers contribute their share of zenies to the reserve zeny pool R_Z. Assuming minimum stake required to participate in Casper consensus is greater than C ethers. Every Zeny-Ethereum staker must reserve zenies worth greater than C ethers.

Situation a. Ethereum staker independently participates in Casper Protocol
The ethereum staker stakes S ethers in Casper Protocol. The reward received by the staker equals 0.12 S.

Situation b. Ethereum staker participates in Zeny-Ethereum network
The ethereum staker reserves zenies equivalent to S ethers to participate. The reward received by the staker approximately equals 0.12(S + S / $(R_E - S)$) ethers. The staker would also receive new zenies based on the rate of reward on reserves at staking-time t_s. For simplicity, if the global pool of ethers R_E equals 2 times Zeny-Ethereum stakers reserve, each staker proportionately earn 2x ethers by participating in the network.

This network of Zeny-Ethereum stakers allow 1 zeny to be redeemable for 1.54 dollars worth of gas at any future time t_f. Any violation of the redeemable condition by any Zeny-Ethereum staker results in slashing of their respective reserved zenies. Every zeny would be redeemable for 1.54 dollars worth of Ethereum gas usage provided the network of Zeny-Ethereum stakers is of substantial size.