Portal Blockchain Tokenomics

Technical Report

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September 2024

1. Introduction

The Portal Platform offers users a new approach to cross-chain asset swaps. Portal's design minimizes trust, limits the potential for censorship, and most importantly, allows users to retain custody of their assets at all times.

Portal architecture builds on a foundation of three fundamental components:

Portal Attestation Chain (PAC): A standalone blockchain that coordinates operations where proposed token swaps and transaction details are posted, and validators come to consensus over the state of the chain and stake Portal's native $P token to bid for slots in future validator pools.

Portal Ethereum Smart Contract (PEthSC): The main Portal Network Ethereum smart contract where fees in ETH and other ERC20 tokens are transferred to Liquidity Providers (LP) and validators following the consensus view on the PAC.

Portal HTLC Smart Contracts (PHTLC): A series of Hash Time Locked Smart Contracts instantiated separately on Bitcoin's L2, Ethereum's L1, and on other blockchains for which swaps will be facilitated.

The purpose of this paper is to provide a detailed analysis of $P's tokenomics.

2. The Tokenomic Model

The primary use of Portal's native $P token is staking on the PAC. This section outlines an abstract parametric model that captures Portal's approach to tokenomics.

2.1. Model Parameters and Variables

r : Discount Factor: One minus the interest rate opportunity cost of capital.

t : Time Period Index: $t \in \{0, \ldots \infty\} \equiv \mathcal{T}$, which indexes each 30-day Portal epoch.

$\mathbf{Q_t}$: Quantity of Tokens: The quantity of $P at the beginning of epoch $t \in \mathcal{T}$ after emissions and burning are complete from the previous epoch.

$\mathbf{P_t}$: Token Price: The equilibrium price of $P at the beginning of epoch $t \in \mathcal{T}$ in dollars after emissions and burning are complete from the previous epoch.

BFee% : Burn Fee Share: The share of fee revenue used to buy tokens to be burned at the end of epochs: $\mathrm{BFee\%} \in [0, 1]$.

August 18, 2024

LFee% : Liquidity Providers' Fee Share The share of fee revenue paid to LPs at the end of epochs: $\text{LFee}\% \in [0, 1]$.

VFee% : Validators' Fee Share The share of fee revenue paid to validators at the end of epochs: $\text{VFee}\% \in [0, 1]$.

LTkn% : Liquidity Providers' Token Share The share of newly emitted $PTB tokens apportioned to LPs: $\text{LTkn}\% \in [0, 1]$.

VTkn% : Validators' Token Share The share of newly emitted $PTB tokens apportioned to validators: $\text{VTkn}\% \in [0, 1]$.

EMT_t : Token Emission: The number of $P tokens emitted at the end of epoch $t \in \mathcal{T}$.

FEE_t : Fee: The dollar value of the native token fees collected from traders using the Portal platform over the 30-day course of epoch $t \in \mathcal{T}$.

RWD_t : Reward: The dollar value of the net reward from all sources collectively received by validators at the end of epoch $t \in \mathcal{T}$.

VTB_t : Value of the Token Base: The collective dollar value of all $P extant the beginning of epoch $t \in \mathcal{T}$.

2.2. Model Mechanics

The mechanics of Portal's tokenomics are as follows:

1. The PAC begins with $Q_0 = 3.5\text{B}$ pre-minted $P tokens.
2. At the beginning of each epoch t, the 42 agents who have staked the highest bids are chosen as validators for the epoch.
3. At the end of each epoch t:
   a. A quantity of $P is emitted (minted) which declines each epoch according the formula:

   $$\text{EMT}_t = 49\text{M}(.99)^{t-1}.$$

   b. $\text{LTkn}\% \times \text{EMT}_t$ is divided over LPs using a formula tied to their relative contributions to the network.

   c. $\text{VTkn}\% \times \text{EMT}_t$ is equally divided over validators.

d. $\text{BFee}\% \times \text{FEE}_t$ is spent buying \$P tokens from current token-holders and burning them, permanently removing them from circulation.

e. $\text{LFee}\% \times \text{FEE}_t$ is divided over LPs using a formula tied to their relative contributions to the network.

f. $\text{VFee}\% \times \text{FEE}_t$ is equally divided over validators.

The pool of validators chosen each epoch collectively controls the PAC through Proof of Stake consensus. Stake can be slashed if a qualified majority of validators/stakeholders decide that one of their peers has behaved in a dishonest or malicious way.

We will make three assumptions in order to sharpen the results of the analysis. Relaxing these assumption changes our conclusions quantitatively, but not qualitatively, and will be discussed in later sections.

Assumption 1 (Efficient markets): All agents are rational and fully informed.

Assumption 2 (Costless validation): The computational and other resource costs of running a Portal validation node are zero. While the opportunity cost of buying and staking \$P to win a validator slot may be nontrivial, the direct cost of running a node should be relatively small in comparison.

Assumption 3: (\$P is a staking token) The \$P token's primary use is staking to gain a seat as one of the 42 validators on the Portal chain. In particular, we assume that \$P tokens are not used for fee payments. In fact, it turns out that some fees will be collected in the form of \$P. Depending on transactions flow, this might have a significant impact on monetary demand. How much is difficult to predict with any precision. Therefore, we first analyze the elements that can be pinned down, and then outline how transaction fee demand might affect these conclusions.

2.3. Timing

The validator pool is renewed at the beginning of every 30-day epoch. Agents who bid but fail to win a validator's slot are allowed to unstake their \$P. New \$P tokens are minted, fees allo-cated to LPs, validators, and to the repurchase and burning for existing tokens. The following graphic outlines the timing of actions over the course of an epoch.

Epoch 0, first block:
- Validators are chosen for epoch 0.
- $Q = Q_0 =$ Genesis block pre-mint.

Epoch 0 = 30 days worth of PAC blocks.

Epoch 0, last block:
- EMT_0 \$P are emitted.
- $LTkn\% \times EMT_0$ \$P is distributed to LPs collectively.
- $VTkn\% \times EMT_0$ \$P is distributed to validators equally.
- $BFee\% \times FEE_0$ is used to buy and burn \$P.
- $LFee\% \times FEE_0$ is distributed to LPs collectively.
- $LFee\% \times FEE_0$ is distributed to validators equally.
- $Q_1 = Q_0 + EMT_0 - P_1 \times BFee\% \times FEE_0$

$\vdots$

Epoch t, first block:
- Validators are chosen for epoch t.
- \$P staked by validators leaving at the end of epoch t is released.
- $Q_t = Q_{t-1} + EMT_{t-1} - P_t \times BFee\% \times Fee_{t-1}$

Epoch t = 30 days worth of PAC blocks

Epoch t, last block:
- EMT_t \$P are emitted.
- $LTkn\ \% \times EMT_t$ \$P is distributed to LPs collectively.
- $VTkn\ \% \times EMT_t$ \$P is distributed to validators equally.
- $BFee\% \times FEE_t$ is used to buy and burn \$P.
- $LFee\% \times FEE_t$ is distributed to LPs collectively.
- $LFee\% \times FEE_t$ is distributed to validators equally.
- $Q_{t+1} = Q_t + EMT_t - P_{t+1} \times BFee\% \times FEE_t$

Note that tokens are purchased and burned in the last block of any epoch t which sets the token price in the first block of the next epoch, $t+1$. That is, epoch t tokens are purchased for burning in the last block of epoch t at a cost of P_{t+1} each.

3. Analysis

We start by examining the impact that tokenomic parameter choices have on the token price and the value of the overall tokenbase. The fundamental driving force behind these dynamics is Efficient Market Theory (EMT).

EMT tells us that the discounted value of all expected rewards to any investment must be accounted for in the current price. Otherwise, there would be arbitrage value in buying more of the asset. This would bid up the current price to the point where the expected reward makes agents indifferent between the asset in question and the next best asset.

Of course, no market is efficient. The EMT approach is used as a baseline to understand what would happen if all agents participating in a frictionless market were both fully informed and rational. Working from this baseline, we can explore the impact of changes in market conditions as well as the effect of specific market inefficiencies.

3.1. Equilibrium Validator Staking

There are two sources of potential payoffs from holding \$P: speculative gains resulting from appreciation the \$P2B's value, and rewards from acting as one of the N validators. Denote these as follows:

SPEC ≡ The present discounted value of excess speculative profits from holding a unit of \$P.

VAL ≡ The present discounted value of rewards allocated to the validator pool $PV(RWD_t)$.

Note that VAL comes from allocations of fees and newly emitted \$P tokens, as well as the impact of emitting and burning tokens on the value of the stake held by validators.

Theorem 1: If acting as a validator has positive value, then all validator slots will be filled in equilibrium.

Proof: Suppose that are N validators slots, but some remained unfilled. Then any agent could become a validator by staking any strictly positive amount of \$P. Thus, regardless of the price of \$P, an agent could purchase and stake a small enough amount of \$P so that the total cost is less than the (positive) value acting as a validator. It follows that there can never be fewer than N validators in equilibrium.

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Theorem 2 characterizes equilibrium in the abstract. We omit time indexes to simply notation, but the result holds separately in every epoch $t \in \mathcal{T}$.

Theorem 2: If acting as a validator has positive value, then validators each hold an equal share of the \$P tokenbase, Q/N, in equilibrium, and $P^* = VAL/Q + SPEC$ is the equilibrium token price.

Proof:

Speculative gains, SPEC, are equally available to all agents, validators, LPs, and users alike. We assume that all agents are rational and fully informed, and so no agent has a comparative advantage in obtaining such returns.

By Theorem 1, all validator slots will be filled, and so agents who win validator slots receive an equal share of validator rewards, VAL/N.

We claim that at all prices, P, all tokens will be held by validators. Suppose instead that a non-validator agent held tokens and consider two cases:

$\mathrm{P} \geq \mathrm{P}^* = \mathrm{VAL}/\mathrm{Q} + \mathrm{SPEC}$: Since price is higher than the present value of speculative awards alone, non-validator agents would be better off selling instead of holding their tokens.

$\mathrm{P} < \mathrm{P}^* = \mathrm{VAL}/\mathrm{Q} + \mathrm{SPEC}$: At this price, any agent could buy Q/N tokens which would guaranteed him a validator slot at a cost of $\mathrm{PQ}/\mathrm{N} < \mathrm{P}^* \times \mathrm{Q}/\mathrm{N} = \mathrm{VAL}/\mathrm{N} + \mathrm{SPEC} \times \mathrm{Q}/\mathrm{N}$, which gives an arbitrage profit. Thus, as long as the price is less than P^* there will be an excess demand for tokens, and so the market will not be in equilibrium.

Now suppose that $\mathrm{P} = \mathrm{P}^* = \mathrm{VAL}/\mathrm{Q} + \mathrm{SPEC}$. Then N agents buying exactly Q/N \$P tokens is an equilibrium. This is because: (a) the cost of purchasing tokens Q/N equals the present dis-counted value of holding them, (b) if any of these N agents held more than an equal share, he could sell the surplus and still be guaranteed a validator slot, and (c) if any of these N agents held less than an equal share, another agent could buy a slightly larger number of tokens, win a validator slot, and make an arbitrage profit.

We conclude that P^* and N agents buying exactly Q/N tokens is the only equilibrium outcome.

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3.2. Equilibrium Token Price

In the section above, we considered the possibility of speculative profits from holding \$P. More precisely, that there might be excess profits driven by an expectation that tomorrow's price will be higher than the opportunity cost of holding tokens today. These are sometimes called eco-nomic or arbitrage profits.

Sadly, there cannot be \$5 bills laying on the ground just waiting to be picked up in equilibrium. If all agents are rational and fully informed, today's price would immediately be driven up to tomor-row's price, and so arbitrage profits will never appear in equilibrium.

This still leaves open the possibility of speculative bubbles driven by the expectation for a greater fool. That is, if in each epoch, the current asset holder believes that a buyer will appear in the next epoch willing to pay a price that justifies the price in the current period, then any series of prices could be supported as an equilibrium.

Of course, the problem is that while fools may not be in short supply, they are a bounded resource. Ponzi schemes always collapse eventually. Only fundamental value is supportable in the long run. Theorem 3 follows.

Theorem 3: The value of the $P's tokenbase in any epoch $t \in \mathcal{T}$, VTB_t, is:

$$P_t Q_t = VTB_t = \sum_{s=0}^{\infty} r^s RWD_{s+t}.$$

Proof: By Theorem 2, $P^* = VAL/Q + SPEC$ is the equilibrium token price. Since we assume rational, fully informed agents, it must be that $SPEC = 0$. It follows immediately that the value of the tokenbase equals the present discounted value the rewards allocated to the validator pool in epoch t:

$$P_t Q_t = VTB_t = \sum_{s=0}^{\infty} r^s RWD_{s+t}.$$

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Note that this implies $\forall\, t \in \mathcal{T}$,

$$P_t = \frac{VTB_t}{Q_t}.$$

Real world factors that might offset this conclusion include:

- Agents may have differing views about the outcome of future events. As a result, they may estimate the likely rewards and the value $P differently. The marginal investor, however, will still satisfy the equations in Theorem 3.
- Agents may have different appetites for risk, and therefore require different levels of risk premia for holding $P. Again, the marginal investor will still satisfy the equations in Theorem 3.
- Agents are irrational or misinformed. If so, then anything could happen.

3.3. Validator Rewards and Equilibrium with zero LP Token Emission Shares

In this section, we analyze the effect of tokenomic parameter choice on validator rewards and equilibrium outcomes when LPs do not get a share of any token emissions.

We begin by considering the effect of direct fee payments to validators in isolation. That is, we assume no tokens are emitted or burned, and some fraction of fees are paid to validators. Note that paying fees to LPs has no impact on token price since LP fee payments are independent of LP token holdings. Thus, paying fees to LPs has neither direct nor indirect effects on the rewards or welfare of validators.

Theorem 4: Suppose that some fraction of platform revenue (fees) is divided equally over validators and that no tokens are emitted or burned:

$$BFee\% = 0,\ VFee\% \geq 0.$$

$$\forall\ t \in \mathcal{T},\ EMT_t = 0,$$

then $\forall\ t \in \mathcal{T}$,

$$RWD_t = VFee\% \times FEE_t$$

Proof: Validators collectively receive $VFee\% \times FEE_t$ in epoch $t \in \mathcal{T}$. Since no tokens are emitted or burned, this is the only reward they receive. Then trivially:

$$RWD_t = VFee\% \times FEE_t\ .$$

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Theorem 4 shows the unsurprising result that if no tokens are emitted and some fraction of fees are paid to validators, the rewards are equal to this fraction of the fees.

Next we consider the effect of using fees to burn tokens. That is, we assume no new tokens are emitted, and no fees are distributed to validators. Instead, fees are either paid to LPs, or spent buying and burning existing tokens.

Theorem 5: Suppose that a fraction of platform revenue is devoted to burning tokens, no tokens are emitted, and no fees are paid directly to validators:

$$BFee\% \geq 0\ ,\ VFee\% = 0$$
$$\forall\ t \in \mathcal{T},\ EMT_t = 0,$$

then

$$RWD_t = BFee\% \times FEE_t.$$

Proof: Each epoch, a fraction of fees is used to buy and burn \$P. By Theorem 2, only valida-tors hold tokens, and so any tokens to be burned at the end of an epoch must be purchased from validators. Whatever the equilibrium price of tokens in epoch t turns out to be, a total of $BFee\% \times FEE_t$ will be paid to validators for some fraction of their token holdings. Since there are no other rewards paid directly or indirectly to validators, the collective epoch t reward to validators is:

$$RWD_t = BFee\% \times FEE_t.$$

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Theorem 5 tells us that burning tokens is completely equivalent to paying fees directly to validators when no new tokens are emitted.

Finally, we consider the effect of emitting tokens, but paying them only to validators.

Theorem 6: Suppose a positive quantity of tokens is emitted and divided equally over validators, and that validators also receive some reward each epoch coming from any combination of token burning and/or fee payments,

$$BFee\% \geq 0,\ VFee\% \geq 0\ , VTkn\% = 1,$$
$$\forall\ t \in \mathcal{T},\ EMT_t \geq 0,$$

then $\forall\ t \in \mathcal{T}$,

$$RWD_t = VFee\% \times FEE_t + BFee\% \times FEE_t \geq 0.$$

Proof: First suppose $\forall\ t \in \mathcal{T},\ EMT_t = 0$. Then following Theorem 4, fees paid directly to validators are added to any other rewards received. Following Theorem 5, any fraction of fees that are allocated to burning tokens must be paid to validators, since they are the only token-holders in equilibrium. Therefore, both of these contribute to the total reward paid to validators each epoch.

Now suppose that some number of tokens, $EMT_t \geq 0$, is emitted in any given epoch t. Following the tokenomic model, these new tokens are divided equally over all validators. We claim that under these circumstances, equilibrium token price simply adjusts downward each epoch such that the value of the tokenbase remains constant:

$$\forall\ t \in \mathcal{T},\ \forall\ ENT_{t-1} \geq 0$$

$$P_t Q_t = \overline{VTB},$$

for some

$$\overline{VTB} \geq 0$$

where

$$Q_{t-1} + EMT_{t-1} \equiv Q_t.$$

By Theorem 3, all valuators hold an equal share of the tokenbase. Thus, when prices adjust as described, each validator ends up holding more tokens each epoch, but the total value of his holding remains the same. In other words, emitting tokens neither helps nor harms validators. The reward to holding tokens, therefore, is exactly equal to the sum of fee payments and token burning expenditures:

$$RWD_t = VFee\% \times FEE_t + BFee\% \times FEE_t \geq 0.$$

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Theorem 6 builds on Theorems 4 and 5 to show that if all emitted tokens are allocated to validators, then while the token price is forced lower, total value of the tokenbase is unchanged. It is still the case that a dollar spent burning tokens is equivalent to a dollar of fees allocated directly from the standpoint of validator rewards. Therefore, the sum of these is the total reward received by validators.

Putting together the results in this section, suppose:

- A positive quantity of tokens, $EMT_t \geq 0$, is emitted each epoch and divided equally over validators,
- Validators also receive some reward, RWD_t, each epoch coming from any combination of token burning and/or fee payments, $BFee\% \geq 0,\ VFee\% \geq 0,\ VTkn\% = 1$.

Then the equilibrium price and quality series, $(P_0, P_1, \ldots)$ and $(Q_0, Q_1, \ldots)$, can be found by solving following system of equations $\forall\ t \in \mathcal{T}$:

$$P_t Q_t = VTB_t = \sum_{s=0}^{\infty} r^s\, RWD_{s+t}$$

$$RWD_t = VFee\% \times FEE_t + BFee\% \times FEE_t$$

$$Q_{t+1} = Q_t + EMT_t - P_{t+1} \times BFee\% \times FEE_t$$

where

$$Q_0 = \overline{Q}.$$

3.4. Validator Rewards and Equilibrium with Positive LP Token Emission Shares

In this section, we consider the impact of allocating a share of the token emissions to LPs. This complicates the tokenomics considerably. When all emissions are divided equally over validators who hold equal shares of the tokenbase, emitting tokens have only nominal effects. In other words, it is a pure, completely anticipated inflation, with no impacts on the real side of the economy.

When LPs receive emissions, however, they will always sell them, since by Theorem 3, validators receive a higher return for holding tokens. This means that validators are the residual claimants for tokens after emissions and purchases for burning are complete. To be more explicit, if purchases for burning end up being less than the number of tokens distributed to LPs, validators must buy any surplus in equilibrium. Similarly, if demand for burning exceeds the supply issued to LPs, validators only get to sell enough tokens to satisfy the excess demand instead of the entire demand as they would have if LP's received no emitted tokens.

The implication is that the reward to validators from emissions becomes the following:

$$\mathrm{BFee}\% \times \mathrm{FEE}_t - P_{t+1} \times \mathrm{LEmt}\% \times \mathrm{EMT}_t .$$

That is, the total allocation of fees devoted to burning tokens minus the cost of buying up all the tokens emitted to LPs.

When emitted tokens go to LPs instead of validators, token prices change in a more complicated way that does not necessarily keep the value of the tokenbase constant. Since validators end up holding all the unburned tokens, and they experience capital gains or loses each epoch that are also part of their net reward:

$$P_{t+1} \times Q_{t+1} - P_t \times Q_t .$$

That is, the value of tokens held at the beginning of epoch $t+1$ minus the value held at the beginning of epoch t.

As always, validators also receive the value of any fees directly allocated to them. Putting this together, the reward for validators in epoch t is the following:

$$\mathrm{RWD}_t = \mathrm{VFee}\% \times \mathrm{FEE}_t + \mathrm{BFee}\% \times \mathrm{FEE}_t - P_{t+1} \times \mathrm{LEmt}\% \times \mathrm{EMT}_t + P_{t+1} \times Q_{t+1} - P_t \times Q_t .$$

This implies that the equilibrium price and quality series, $(P_0, P_1, \ldots)$ and $(Q_0, Q_1, \ldots)$, can be found by solving following system of equations $\forall\ t \in \mathcal{T}$:

$$P_t Q_t = \mathrm{VTB}_t = \sum_{s=0}^{\infty} r^s \, \mathrm{RWD}_{s+t}$$

$$\mathrm{RWD}_t = \mathrm{VFee}\% \times \mathrm{FEE}_t + \mathrm{BFee}\% \times \mathrm{FEE}_t - P_{t+1} \times \mathrm{LEmt}\% \times \mathrm{EMT}_t + P_{t+1} \times Q_{t+1} - P_t \times Q_t .$$

$$Q_{t+1} = Q_t + \mathrm{EMT}_t - P_{t+1} \times \mathrm{BFee}\% \times \mathrm{FEE}_t$$

where

$$Q_0 = \overline{Q}.$$

4. Portal Tokenomics Model

Portal's proposed tokenomic model is defined by the following parameter and variable choices:

$$\mathrm{BFee\%} = .5\ ,\ \mathrm{LFee\%} = .5\ ,\ \mathrm{VFee\%} = 0$$
$$\mathrm{LTkn\%} = .1\ ,\ \mathrm{VTkn\%} = .9$$
$$\forall\ t \in \mathcal{T}\ ,\ \mathrm{EMT}_t = 49\mathrm{M}(.99)^{t-1}$$
$$Q_0 = 3.5\mathrm{B}.$$

Two additional elements are needed to fully calibrate the model:

Fees or platform revenues: Portal tokenomic documents make the following estimate as steady-state fees collected in bitcoin, ETH, ERC20, and other native tokens on various chains:

- The combined daily volume of the top 20 decentralized exchanges is approximately $4.5B.
- Portal will capture 10% of total DEX volume.
- Fees will be .25%.

This gives a gross fee revenue of $34M per 30-day epoch.

It may or may not be that all of this is captured as net revenue after smart contract and other non-portal chain and contract fees are paid. Any costs associated with providing validator services (assumed to be zero so far) must be also deducted from net revenue to validators.[1] Moreover, it might be that revenue will, or will be expected to, increase from a lower level and reach or exceed this estimate over time. All of these factors will have an effect on the price that $P ultimately realizes.

Discount factor: Given that there is risk inherent in crypto and any new platform, we would expect $P holders to require a premium above the risk-free rate. Although there is no way to pre-dict this value with certainty, a reasonable estimate might be on the order of 12%. This trans-lates to 1% per epoch, for an inter-epoch discount factor of $r = .99$.

4.1. Estimates of $P Token Value with Zero LP Token Emission Shares

To begin with, suppose that we altered Portal's parameterization so that LP emission share was zero:

$$\mathrm{BFee\%} = .5\ ,\ \mathrm{LFee\%} = .5\ ,\ \mathrm{VFee\%} = 0$$

1 There are almost certainly economies of scale in doing validator work. Validation requires paying the expense of querying other chains for current transactions and contract states, the compute and storage cost of block building and transaction verification, and so on. Any agent who does so, however, can provide the same results at any number of endpoints. Thus, an agent could do the validator work once, stake and win 20 validator slots, point them at 20 end points in AWS, and get 20 times the rewards for only slightly more cost than running a single validator client. As a result, we are likely to see Sybiling in the validator pool.

$$\mathrm{LTkn\%} = 0,\ \mathrm{VTkn\%} = 1,$$

Given that $\mathrm{FEE} = \$37\mathrm{M}$ per epoch, rewards will be:

$$\forall\ t \in \mathcal{T},\ \mathrm{RWD}_t = \$17\mathrm{M},$$

which implies that the value of the tokenbase is constant and equal to:

$$\mathrm{VTB} = P_t Q_t = \sum_{s=0}^{\infty} r^s\ \mathrm{RWD}_{s+t} = \frac{\$17\mathrm{M}}{1-r} = \frac{\$17\mathrm{M}}{.01} = \$1.7\mathrm{B}$$

and an epoch $t = 0$ token price of:

$$P_0 = \frac{\$1.7\mathrm{B}}{3.5\mathrm{B}} = 48¢.$$

If no tokens were emitted or burned, this price would persist in all periods.

Portal's tokenomics calls for 49M tokens to be emitted in epoch $t = 0$. Since \$17M is allocated to burning tokens in every epoch, approximately 35M tokens will be purchased and burned at price $P_0 = 48¢$. This results in a net increase in the size of the tokenbase by 14M tokens and a lower token price in epoch $t = 1$. After some number of epochs, however, new token emissions drop below the number burned. From this epoch forward, tokenbase will decline, and token price will increase.

4.2. Estimates of $P Token Value with Positive LP Token Emission Shares

Portal's tokenomics calls for 10% of newly emitted tokens to be allocated to LPs. This means that in epoch $t = 0$, 4.9M tokens will go to LPs, while 44.1M will go to validators. Since approximately 35M tokens will be burned in epoch $t = 0$, validators only lose out on about 14% of these sales. Thus, validator rewards will be on the scale of \$14.6M instead of \$17M. The value of the tokenbase and token price should drop proportionally.

4.3. Implications of Requiring Fees being Paid in Part in $P

Shifting some fee payments out of ETH, BTC and other native tokens and into $P should not in itself affect the overall level of fees collected. Thus, all else equal, the tokenomic estimates above should not change.

If users must hold $P in order to use the Portal platform, however, an additional demand for the token is created. It is no longer be the case that validators hold all the tokens. Cash-in-advance arguments suggest that there will be a steady-state level of $P held by users in anticipation of paying for future transactions.

The impact of users holding tokens is to reduce the share of the tokenbase held by validators. Since the value of the tokenbase, as derived in Section 3, applies only the share held by validators, the price of the token will have to go up, even in epoch $t = 0$. For example, is users held 1B out of the 3.5B pre-minted $P, it is likely that $P_0 \approx 66$ ¢ instead of $P_0 \approx 48$ ¢.

While clearly positive, the exact impact of using $P for fee payments can only be estimated. The exact effect depends on platform usage, fee levels in each epoch, and especially, user willing-ness to hold P and thereby effectively remove it from the circulating tokenbase.

5. Conclusion

The $P token has four main uses:

- Staking in order to gain a seat as a validator.
- Paying validators for their services to the chain.
- Paying LPs for putting tokens of various types in HTLCs to facilitate non-custodial swaps.
- Charging users fees for these services.

An on-chain native token is needed both for staking and to allow the exchange of value between platform actors. Thus, $P is fuctionally necessary for the Portal platform to operate as its proto-col requires.

The value of the tokenbase is primaily determined by the present value of fees of paid to valida-tors, and so the token cannot be considered a speculative asset. Rather, it is a fuctional medium of exchange. The value of the token itself is affected by the balance between new issueance and token burning built into the protocol. Given the parameters of the tokenomics, it is likely that $PTB's value will decline slightly in the early epochs due to modest net increases in the size of the token-base. The rate tokenbase increase will steadily decline. Token emissions will then fall below token burning, which will result in accellerating increaes in token value in all future epochs.

Given projected market share, the value of the tokenbase should be on the order of $1.7B. This estimate, however, disregards tokens held by users to pay platform fees. Thus, $1.7B should be considered a minimum if market share estimates are correct.

In general, Portal's tokenomics are sound and transaparent, ultimately leading to predictable year over year increases in token value.