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De-Fi Protocol Token Valuation by Projecting Token Flows and Estimating an Appropriate Risk Premium

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Senior Paul Honors Thesis

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Introduction

The financial world is changing quickly and promptly as new asset classes are being developed and traded virtually in cryptocurrency or digital assets. Digital assets operate differently than traditional assets because they can be developed by anyone and they are decentralized. This means that no large institutions are controlling the transactions on decentralized platforms where there is a multitude of financial services. These platforms/protocols operate on tokens, which make up their microeconomies, which are outlaid in a protocol's tokenomic structure. I assume that in analyzing the tokenomic structures of these decentralized platforms tokens, it is possible to find a fair value for what an investor should be willing to pay based on what the platforms return in the form of token flows.

Traditional assets like stocks and bonds have valuation methods that discount future cash flows to value what they should pay for that asset today. Because these platforms mint and distribute their tokens as rewards for using the protocol, these token distributions can be considered cashflows. This dissertation aims to evaluate if traditional asset valuation methods like a DCF model can be used or altered hopefully to accurately value this form or digital asset and consider what drives the value of these tokens.

Literature Review

De-Fi

Cryptocurrency is swiftly changing people's lives in many ways and has opened new ways of investing, raising, and protecting capital. Crypto began in 2008 after the financial collapse when Bitcoin was created. Since, Bitcoin has had many predecessors, most notably Ethereum, Binance Smart Chain, Terra, Avalanche, XRP, Solana, and Cardano. Collectively, at the market's peak in November of 2021, Blockchain assets reached a total value of 2.9 trillion dollars and are currently at 1.75 trillion.

Bitcoin's predecessors differ from Bitcoin because they are networks rather than a currency. These networks use smart contracts, which are automated transitions between two parties. These contracts are irreversible to eliminate the need for more intermediaries like banks, exchanges, and insurance firms. There are numerous applications for blockchain technology that operate on the premises of decentralization and what are known as Web-3 applications. Web-3 hosts many new and interestingteresting protocols such as gaming platforms, virtual reality metaverses, decentralized autonomous organizations, finance, and social media. Virtually all these Web-3 applications operate via tokens. There are many different forms of tokens that have a multitude of uses.

Token Classifications and De-Fi Products

Within De-Fi, multiple token types are used in protocol infrastructures. The first can be called an equity or governance token. These tokens give the holder a say or equity in the platform. For instance, someone purchases a token offered by a decentralized casino. This token

pays the holder a dividend off the earnings brought in by the casino. Another example of this is Planet Finance's Aqua token which is used as a voting token for decisions regarding the treasury and other important decisions.

The other form of token is the reward token. These are extremely common among Defi protocols and reward users for investing in and using the platform. Currently, the most popular products in De-Fi are swaps, crypto collateralized lending borrowing services, and yield farms. A crypto swap is just an exchange. People earn fees on these swaps by providing liquidity by depositing funds into what is known as a liquidity pool. (*What Is a Liquidity Pool?* n.d.) To best describe a liquidity pool, it is best to use the centralized fiat example as a contrast first.

Paul is traveling from The United States to France, which means he needs to convert his US Dollars into Euros. Paul does this by either going to a bank or an exchange company that holds millions of Dollars and Euros in reserves. When Paul exchanges his $100 for whatever the current spot rate of the USD/EUR is, he pays the current rate plus a fee or spread. This fee or spread is how the bank or exchange earns its revenue. The concept in crypto works the same way. Paul has 1 Ether (ETH) and would like to convert his ETH into a USD pegged stable coin. Presuming that the current spot rate of ETH/USD is 2,500 plus whatever the fee is on the swap protocol. Because these swaps are decentralized, they rely on investors to provide liquidity to the protocol. As these investors are the ones providing the liquidity, they too are the ones earning the swap fees. Different protocols have different fee structures, but these fees generally are around .15% to .25% of the transaction. These liquidity pools do not come without risk. Investors are exposed to impermanent loss if the pool is two stable coins, such as DAI/BUSD, where the prices are pegged. Impermanent loss occurs when the price of one coin fluctuates vs. the other. This is because the investor invests in a liquidity pool; he is investing in a stake in the pool and, when withdrawing, is entitled to his stake ratio in the pool, not a certain number of tokens. (*Impermanent Loss Explained*, n.d.) The goal of being a liquidity pool investor is to make up for these losses by earning fees paid in both the base tokens and protocol reward tokens.

Reward tokens are also paid out on most collateralized crypto lending services (CCLS) protocols. A CCLS runs on the premise of the investor needing to supply crypto to the money market before they can borrow. Once they have supplied these assets, the investor can then use those assets as collateral to borrow other crypto assets supplied in the money market. On most protocols, the investor can borrow about 75-90% of what they have supplies to the market. If borrowed positions go up or supplied positions go down, the investor may face liquidation risk when the collateral to debt ratio reaches 1:1 or close. If this happens the investor's supplied collateral is used to cash out the debt and there is also a small fee that the investor is typically charged.

Like a traditional money market, money suppliers earn interest on their assets, and borrowers pay interest. What makes CLLS protocols unique is that they pay reward tokens on both the supply and borrow sides. These reward tokens boost returns for suppliers and can deduct the APY or even make the APY positive on the borrowing side.

Tokenomics

Much like the tangible world, where value is derived from utility, crypto assets also hold value because of their utility. Tokens on the blockchain have a variety of different use cases. Like traditional economics, token economics operates on the same supply and demand principles that determine currency or commodity prices. However, the significant difference is that crypto

tokens' economic principles are built into computer code, and all token holders have governance over that token. There are hundreds of different tokenomic structures that protocol developers have created. In Sean Au and Thomas Power's book *Tokenomics: The Crypto Shift of Blockchains, ICOs, and Tokens,* Au and Power describe tokenomics, including game theory, mechanism design, and monetary economics. (Au & Thomas Power, 2018, p. 9) Like real-world economics, they separate tokenomics into two parts, microtokenomics and macrotokenomics.

> Microtokenomics can be considered as features that drive the functions of individual participants within a blockchain economy. Examples include mining rewards and how they change over time, and the mechanics needed to adjust the token supply, demand, and velocity, such as vesting periods, the mining difficulty, and the inflation rate.
>
> Macrotokenomics consists of features that relate to the interaction with the wider blockchain economy, and they tend to include governance (such as who decides what the next new feature is), the participant interaction within the ecosystem, and also the external factors of the token growth and volatility (such as the utility of the token and the liquidity on exchanges). It is the interaction of all these variables that produces what is known as a 'token economy.'(Au & Thomas Power, 2018, pp. 10–11)

Valuation

Thousands of protocols have been created on the blockchain, each with its own tokenomics system engrained in complex code and described in the protocol's white papers. Unlike the real world, there is no generally accepted method for valuing virtual and decentralized assets. In today's economy, the authors of Digital Asset Valuation note three methods for valuing assets: the Asset Approach, Market Approach, and Discounted Cash Flows. This dissertation used both the Market Approach and a DCF model to see if they could value some form of crypto asset. In their conclusion, this is what they found:

> Traditional valuation methods only limitedly apply to digital assets. While there are large commonalities, the digital assets space requires a disparate analysis of digital asset pricing. Digital asset valuation methodologies vary significantly. Tradeoffs between such methodologies allow for some valuation discretion between digital asset managers. The lack of standards for digital asset valuation leads to uncertainty and confusion among investors and managers. The industry would benefit from uniform standards for digital asset valuation. Such standards can evolve over time as the market evolves. (Kaal et al., 2022)

ULU Ventures a Palo Alto, California based VC firm has come up with their own method of pricing digital assets by setting core principles for value determination. In their own words they state “The truth is, there does not appear to be a widely accepted method for making this important calculation, so we undertook to construct and articulate our own. The process involved in-depth conversations with attorneys, academics, auditors (ours and others’), and industry luminaries, and literature reviews.” Their model for valuating crypto assets is comprised of 4 pillars.

Pillar 1 states “Value should represent long-term, intrinsic value, not short-term volatility.” What this pillar explains is that the investor should be focused on the long term with the crypto asset they are evaluating. In their model they evaluate the weighted average price of the asset over a fiscal quarter. Pillar 2 states “Value should include a liquidity risk discount based on objective measures.” This pillar explains that because there are no “right” discount rates for valuing crypto. In their models the discount rates can vary from 0-90 %. The other portion of this pillar states that a liquidity risk should only be added in early stage cashflows. Pillar 3 states “Value should be comparable with value as calculated for any other startup investment.” This pillar is firm specify and may be different for other institutions which incorporate the costs of owning a specific asset like fund fees and taxes. Pillar 4 states “Value should be based on a consistent set of considerations.” This pillar says that the valuation method must remain consistent over an asset’s lifespan.

ULU ventures method for valuating crypto follows this formula where $Av =$ Asset Value, $C =$ initial cost of the asset, Weighted Avg Token Price $= Wtp$, discount rate $= r$, tax rate $= t$, # of tokens $= Tq$

$$Av = C + ((Wtp - C) * r * (1 - t) * Tq$$

Cryptoasset Valuation Identifying the Variables of Analysis outlines the differences between crypto-assets and Trad-Fi assets. “While stock evaluation is largely made up of financial variables and ratios, tokens are fully digital entities that exist on a networked plane. Thus, the kinds of variables that need to be analyzed are not just financial but technical as well, especially when analyzing smart contracts.” (Kary Bheemaiah & Collomb, 2018, p. 20). This research mentions seven valuation methods which include macroeconomic analysis (mv=pq), network ratios, options pricing methods, chartism or technical analysis, network value and Metcalfe’s law, community-related metrics, and adjusted DCF methods.

Methodology

Token Selection

While there are no accepted ways to currently value digital assets, the purpose of this dissertation is researching a valuation method for tokens that are earned as rewards or cashflows by finding and applying an appropriate discount rate. The criteria for these coins are as follows:

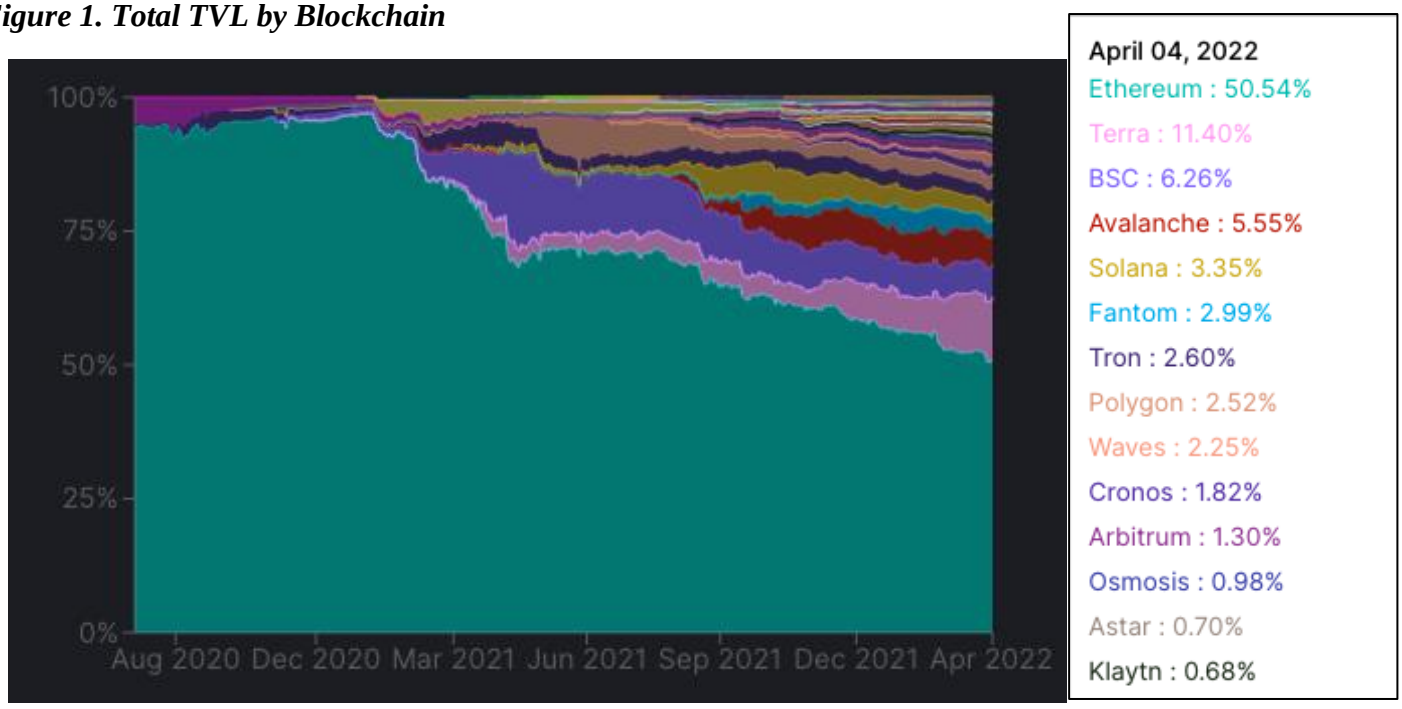
1	The token is received as a cashflow from an investment in the base token or another token spawning from a liquidity pool, lending platform, or vault.
2	Total value stored (TVL) on the protocol must be greater than $20 million
3	Only Binance chain
4	Token must be able to be re-staked as itself
5	Protocol must have recent audit
6	Protocol cannot be in beta stage of development

There are thousands of protocols across many over 80 different blockchains; determining an appropriate discount rate as a standard for all chain environments at the moment is impossible. The criteria above aim to narrow down the environment into one chain to find a true risk-free rate on the Binance chain. Using one chain will better the chances of accurately finding protocol reward tokens' actual value, but it will also give more insight into the macro environment of the chain. By understating the macro chain environment on one chain, it may give insight for further research on other chains.

Why the Binance Smart Chain?

The Binance Smart Chain (BCS) is the third-largest blockchain in total value locked (TVL). The two chains in front of BCS are Ethereum and Terra. Ethereum currently has a TVL of $90.24b, while Terra has a TVL of $20.89b, and BCS has a TVL of 11.2b. Many crypto experts, including Keith Black, Ph.D., view web-3 and crypto as the next dot-com bubble. (*Are Cryptocurrencies the New Dot-Com Bubble?* 2021) Keith is an advocate of crypto, but he admits soft diligence must be done when investing. In my diligence, here is why I believe BCS is the best chain currently. Although Ethereum has the most protocols (592) in De-Fi, Binance has the second most out of any other blockchain with 357. Terra only has 26 as of now. (*DefiLlama*, n.d.) The major downside with Ethereum is the price of gas to compute intelligent contracts. These gas prices range from $30-100 per interaction, which is extremely expensive compared to BCS, which ranges from ¢5-20. This is partially why Ethereum's share in total blockchain TVL has decreased drastically in 2022.

Figure 1. Total TVL by Blockchain



Source: DefiLlama, https://defillama.com/chains

Token Analysis

This model will be modeled using 7 coins that have similar tokenomics and utility all of which are traded, staked, and held on the BCS chain.

SUSHI

Sushi Swap has two reward tokens, one that comes from liquidity pools, which is SUSHI and the other xSUSHI which comes from yield farming SUSHI. xSUSHI is always worth more than a regular SUSHI token, because xSUSHI accrues value from platform fees. When users make trades on the Sushi Swap exchange a 0.3% fee is charged. 0.05% of this fee is added to the Sushi Bar pool in the form of LP tokens. The newly purchased Sushi is then divided up proportionally between all the xSUSHI holders in the pool, meaning their xSUSHI is now worth more SUSHI. There is a cap of 250 million SUSHI which is expected to be reached in November of 2023. (*SushiSwap,* n.d.)

BANANA

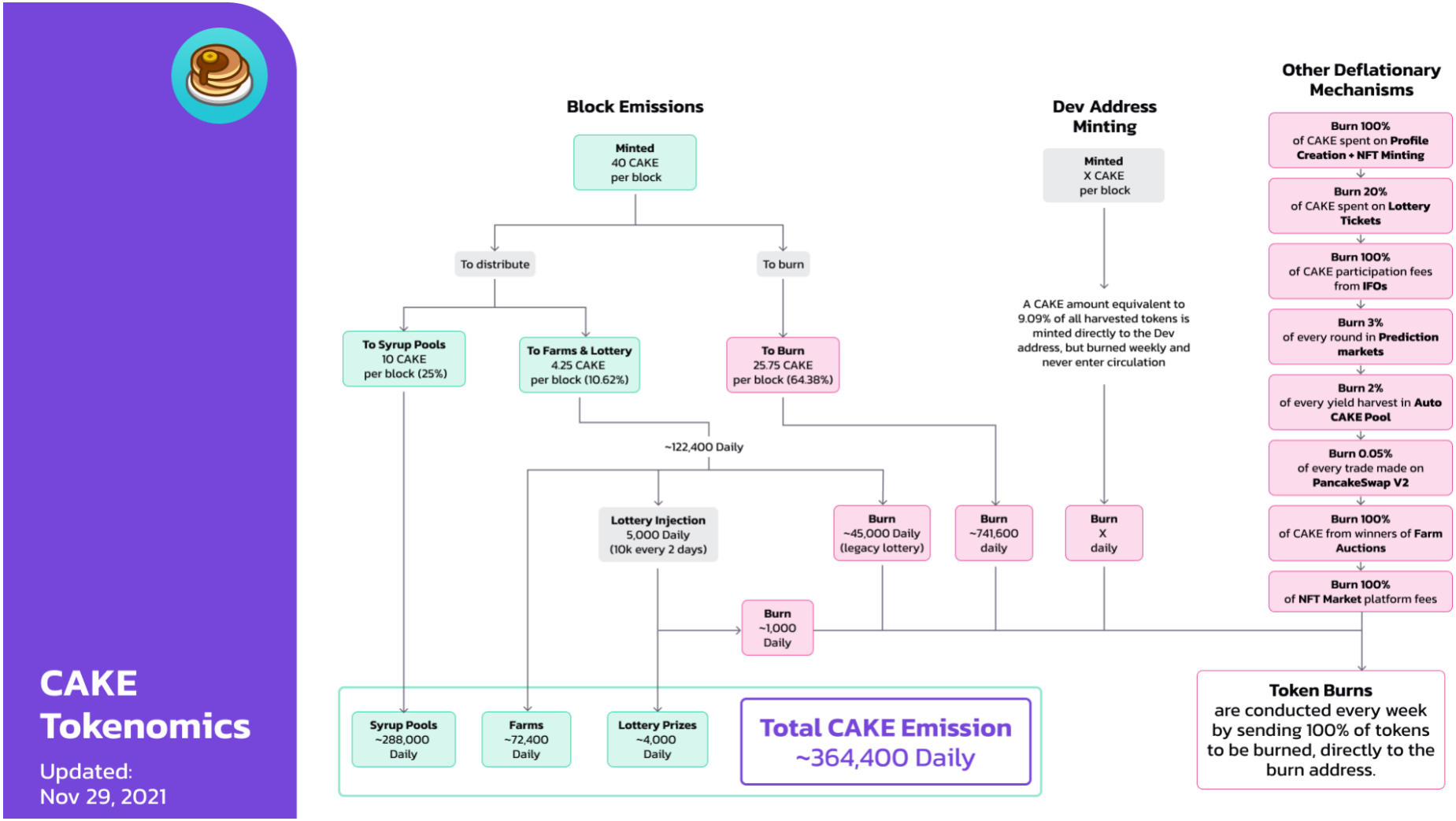
Banana is the token on the protocol called Ape-Swap. Banana tokens can be earned through yield farming, liquidity pools and via lending/ borrowing rewards and staking NFTs. Banana can also be converted into gBanana. When converting to gBanana the holder suffers a 30% value burn initially however the gBanana token allows the holder to partake in initial coin offerings and governance. gBanana is ultimately backed 1:1 by Banana and can be converted back to Banana. Banana has no hard cap meaning. it is an inflationary token. The protocol emits 316,800 banana a day. (*BANANA Tokenomics*, n.d.)

CAKE

CAKE is the token on the Pancake Swap protocol. Currently, Pancake Swap is the most significant De-Fi protocol on the BCS, with a TVL of $4.93 billion. Pancake swap only has one token, unlike Ape-Swap and Sushi Swap, and it was also one of the first De-Fi protocols launched on the BCS. Pancake Swap offers yield farming and staking, which can earn investors CAKE. In relation to being the largest De-Fi protocol on BCS, CAKE also has the third-highest market cap on the BCS, only behind BNB, the native token, and RUNE. The current market cap of CAKE is $2.4 billion. The market cap of CAKE far exceeds the value of other De-Fi tokens on the BCS. For instance, the next highest market cap on the BCS for a De-Fi token is XVS which is $139 million.

CAKE is a no cap token; however, its tokenomics work similarly to Banana. Currently, 1,152,000 CAKE are added to the market, and 787,600 CAKE are burned a day at a net emission rate of 364,400 CAKE daily. (CAKE, n.d.) according to Pancake Swap's white pages, Cake is burned in the following ways.

Figure 1. Pancake Swap Tokenomic Breakdown



Source: https://docs.pancakeswap.finance/tokenomics/cake

GAMMA

GAMMA is the token on the Planet Finance protocol. GAMMA tokens can be earned through yield farming, liquidity pools, lending/ borrowing rewards, and AQUA staking. AQUA acts as the governance token of Planet Finance and cannot be used in the token classification for this analysis. Unlike CAKE and Banana, GAMMA has a max supply of 100 million, making it a hard cap token. GAMMA has a multitude of utilities. By owning more GAMMA and maintaining a 1:10 GAMMA to total supply value, investors receive increased yields and reduced borrowing fees on the lending platform. GAMMA can also be staked in liquidity pools and be used to purchase NFTs when they become available on Planet Finance. Gamma is much smaller by market cap value, with a current market cap of $5.9 million. (What Is Planet? n.d.)

XVS

XVS is the main token on the Venus protocol. Venus' main function is lending however it does offer staking but only for the protocols tokens which are VAI the protocols synthetic stable coin, and XVS. XVS has a current market cap of $139 million and is the second largest De-Fi token on BCS. XVS will have a cap supply of 23 million. (*Whitepaper.Pdf*, n.d., pp. 6–8)

ALPACA

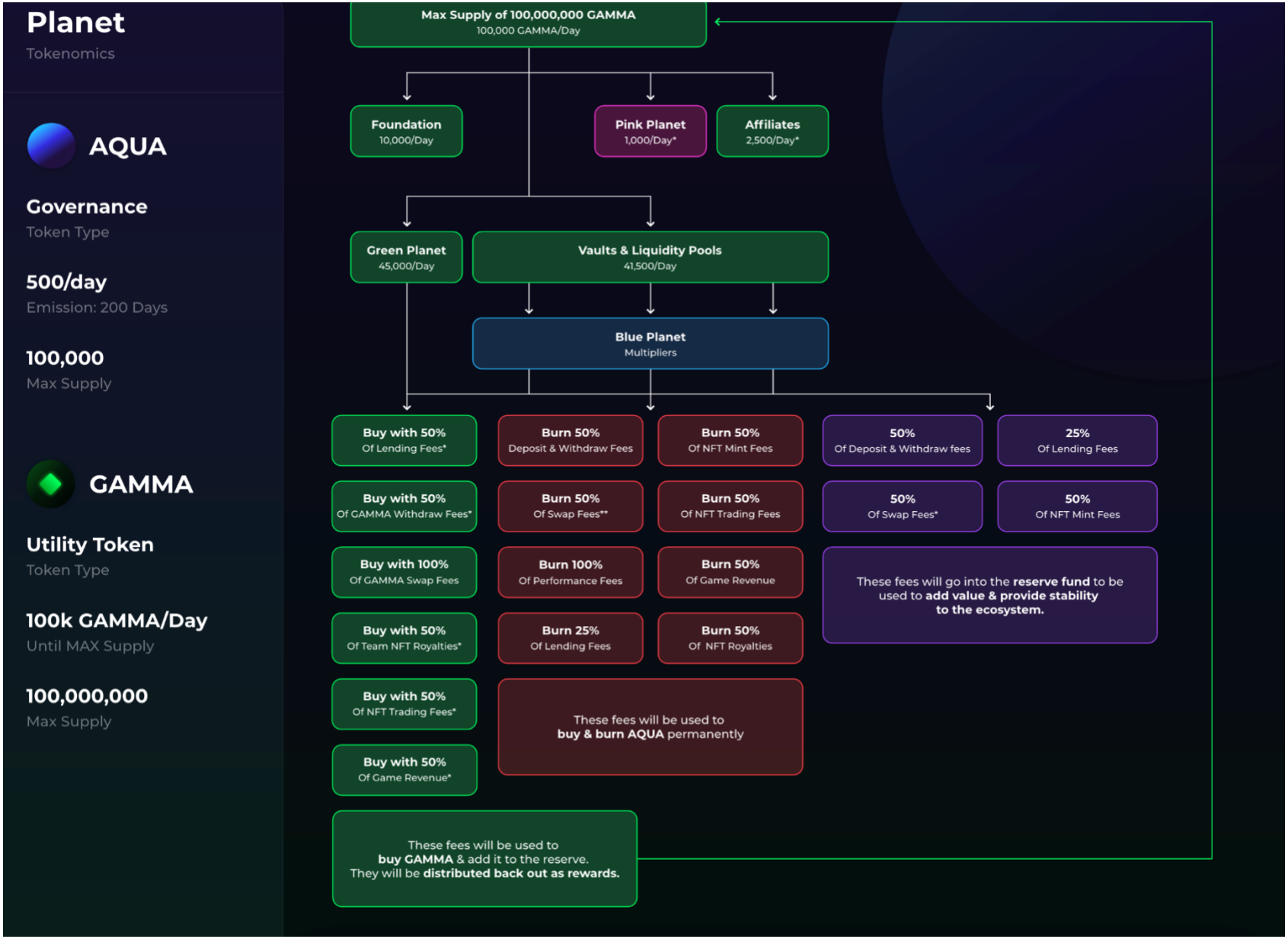
ALPACA is the coin on Alpaca Finance. ALPACA tokens are earned through yield farming and staking. What makes Alpaca Finance's farms unique is the protocol allows for the investor to take leveraged positions in the yield farms which offer greater returns but higher interest expenses. ALPACA can be used to ALPACA currently has a market cap of $14.3 million dollars. ALPACA tokens are long-term deflationary meaning the supply has a hard cap 188 million ALPACA. The burn fees are listed below. (*ALPACA Token*, n.d.)

- **10%** of the 19% performance fees for yield farming positions on the single-asset CAKE vault is distributed as Protocol APR to ALPACA governance vault depositors.
- **4%** of the 5% of every liquidation bounty that any liquidation bought receives as a fee, goes towards buybacks and burns of the ALPACA token.
- **10%** of 19% of the lending interest that lenders earn goes towards buybacks and burns of the ALPACA token.
- **2.5%** of 5% royalty fees on Alpie NFTs sold in the secondary market go to ALPACA buyback & burn.
- **5%** of 9% of Auto-Farming Performance Fee, which is from rewards earned from farming the collateralized assets in AUSD positions in Alpaca Staking (and potentially external protocols in the future) will be used for buyback & burn.
- **1%** of 2% of Stability Fee charged on each AUSD debt position will be used for buyback & burn.

BSW

BSW is the token from Biswap. Biswap allows its users to earn BSW through yield farming and staking. BWS has a max supply of 700 million tokens and a market cap of $264 million. BSW has a daily emission of 576,000 and a monthly emission of 17.28 million. In March 2022, BSW burned 5.14 million tokens.

Figure 2. Planet Finance Tokenomic Breakdown



Source: https://docs.planetfinance.io/tokenomics/key-details

Figure 3: BSW Tokenomic Breakdown

Source: https://docs.biswap.org/general-information

Figure 4: BiSwap Burn Schedule

biswap			Trading Fees	Accounts With No Referrers	Auto-compound Performance Fee	Lottery Ticket Purchases	BRE NFT Launchpad	Partner's NFT Launchpad	NFT Marketplace Fees	BRE NFT Royalty Fees	GameFi NFT Launchpad	IDO Revenue	Biswap Holder Pool Fee	Bus NFT Royalty Fee	Player NFT Royalty Fee	Game Contract Revenue	Bus Mint Revenue	Player Mint Revenue	Free BSW Pool	Total Per Burn
Q2, 2021	June 1, 2021	Burn #1	70,214	172,741	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,902	268,857
	June 8, 2021	Burn #2	58,018	113,110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171,128
	June 15, 2021	Burn #3	90,599	120,941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211,540
	June 23, 2021	Burn #4	132,081	112,485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	244,566
Total Per Quarter 2, 2021																				896,091
Q3, 2021	July 1, 2021	Burn #5	507,231	123,219	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	630,450
	July 9, 2021	Burn #6	177,076	135,214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	312,290
	July 16, 2021	Burn #7	130,956	212,946	15,930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	359,832
	July 24, 2021	Burn #8	152,473	171,126	13,179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	336,778
	July 31, 2021	Burn #9	178,781	163,528	11,024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	353,333
	August 7, 2021	Burn #10	147,027	132,291	11,747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	291,065
	August 14, 2021	Burn #11	199,351	125,064	9,683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	334,098
	August 21, 2021	Burn #12	162,075	126,537	9,884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	298,496
	August 28, 2021	Burn #13	312,636	131,445	11,169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	455,250
	September 4, 2021	Burn #14	296,406	122,064	10,380	0	0	0	0	0	0	0	0	0	0	0	0	0	0	428,850
	September 12, 2021	Burn #15	523,478	124,054	10,328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	657,860
	September 23, 2021	Burn #16	734,236	175,103	12,432	16,343	0	0	0	0	0	0	0	0	0	0	0	0	0	938,114
Total Per Quarter 3, 2021																				5,396,416
Q4, 2021	October 1, 2021	Burn #17	583,796	113,732	10,319	13,911	0	0	0	0	0	0	0	0	0	0	0	0	0	721,758
	October 8, 2021	Burn #18	550,112	116,689	8,611	14,788	0	0	0	0	0	0	0	0	0	0	0	0	0	690,200
	October 21, 2021	Burn #19	894,038	180,025	17,156	22,815	0	0	0	0	0	0	0	0	0	0	0	0	0	1,114,034
	October 29, 2021	Burn #20	489,477	126,689	8,574	16,056	0	0	0	0	0	0	0	0	0	0	0	0	0	640,796
	November 10, 2021	Burn #21	743,035	166,856	13,742	21,426	64,800	0	0	0	0	0	0	0	0	0	0	0	0	1,009,859
	November 26, 2021	Burn #22	1,284,490	210,029	19,937	30,412	60,000	0	24,754	24,412	0	0	0	0	0	0	0	0	0	1,654,034
	December 22, 2021	Burn #23	1,800,584	271,627	41,653	47,520	210,000	0	39,020	80,811	180,000	102,900	0	0	0	0	0	0	0	2,774,115
Total Per Quarter 4, 2021																				8,604,796
Q1, 2022	February 5, 2022	Burn #24	3,907,455	423,105	43,842	76,352	0	0	373,856	28,154	0	0	53,061	16,452	98,445	674,047	47,499	421,689	0	6,163,957
	March 12, 2022	Burn #25	3,523,095	329,070	10,512	53,494	25,000	31,250	148,038	14,680	0	0	111,121	13,103	51,158	694,715	14,780	120,114	0	5,140,130
Total Per Quarter 1, 2022																				11,304,087
Total BSW Burned			17,648,720	4,199,690	290,102	313,117	359,800	31,250	585,668	148,057	180,000	102,900	164,182	29,555	149,603	1,368,762	62,279	541,803	25,902	26,201,390
% Per Each Category			67.36%	16.03%	1.11%	1.20%	1.37%	0.12%	2.24%	0.57%	0.69%	0.39%	0.63%	0.11%	0.57%	5.22%	0.24%	2.07%	0.10%	100.00%

Source: BSW Burn Breakdown, https://docs.biswap.org/bsw-token-burn/bsw-burn-breakdown

These tokens were selected because of their analogous tokenomics structure. Although the platforms differ in the investment vehicles, they all offer the investor cashflows or, in this case, "token flows" from either staking, supplying/ borrowing, or providing liquidity. All these token flows come in the protocol's respective token, whether the investor enters the position in the protocol token, a stable coin, or some other cryptocurrency such as BNB. The tokenomics structure for these coins is similar because they all, except for XVS, have deflationary measures to control the total supply. When the tokens are taken from the protocol in transaction fees, one of two things can happen. The tokens are either used to reward investors. Rewards are allocated and paid out on a per-block basis. For instance, here is the payout structure on Biswasp:

.• **Farms / Launchpools:** 80.7% per block
- **Referral Program:** 4.3% per block
- **SAFU:** 1% per block
- **Team:** 9% per block
- **Investment Fund:** 5% per block

Some protocols reward per block (RPB) remain the same while others have a decay. Out of these 7 coins, ALPACA is the only one with this system. This will be discussed in terms of token valuation later.

Figure 5

ALPACA RPB Schedule	
April 2021	22.00 RPB
Sep 2021	6.60 RPB
Jan 2022	2.2 RPB
June 2022	1.65 RPB
Oct 2022	1.10 RPB
Feb 2023	.55 RPN

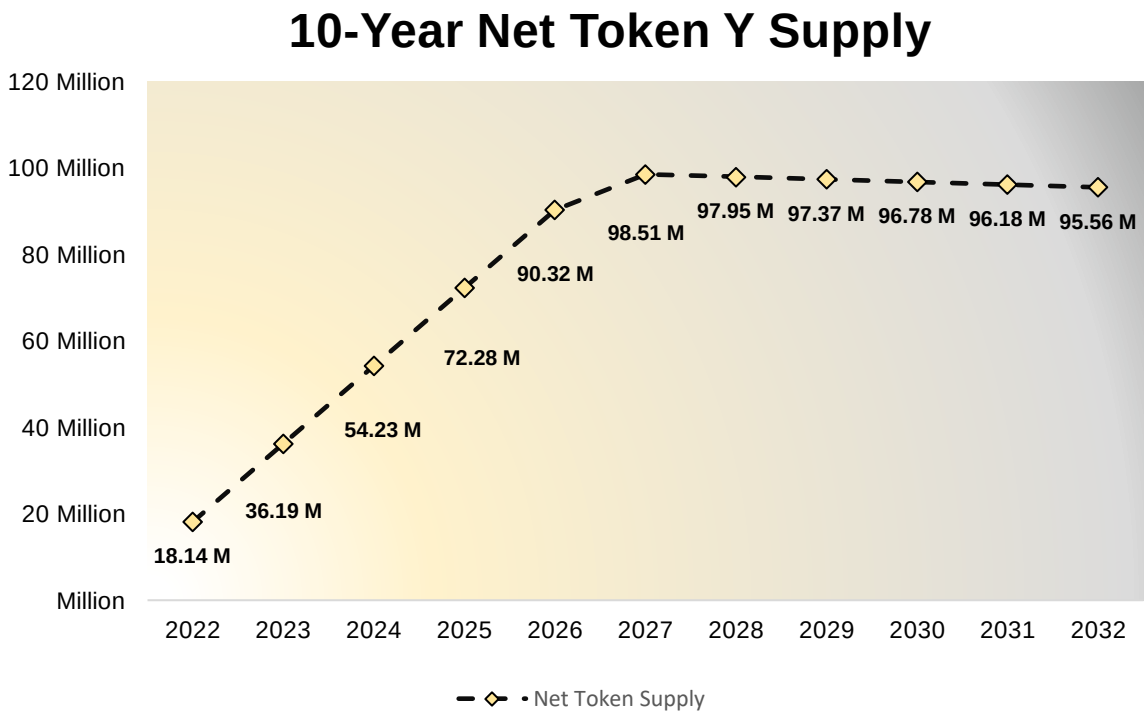
The other possibility when tokens are taken out of circulation is they are sent to a burn wallet. A burn wallet is an irreversible action that takes the coins out of circulation permanently and decreases the overall supply. This is important because all the coins in this study have a hard cap except for CAKE and SUSHI. This causes deflation and is also important for token valuation.

Token Y Models

Let us create a tokenomics model and call it *Token Y. Token Y* will encompass similar characteristics/assumptions as the real tokens being analyzed. Let us assume that *Token Y* has a hard cap of 100 million tokens. Let us also assume that until the hard cap is reached, 50,000 of *Token Y* will be minted daily. 500 tokens a day will go to developers during the mining stage. Another important assumption is that *Token Y* has an outstanding token amount of 6.5 million on May 1, 2022. In using this information, we can estimate the total tokens in the market. *Token Y* has both burn mechanisms and fee redistributions. Borrowing fees and *Token Y* swap fees are 2% and NFT transaction are 1%. For these three fee structures ¾ of the tokens will be redistributed to the protocol holders as token flows and ¼ will be burnt. A constant and arbitrary discount rate of 11% will be used for this model.

Figure 7. below depicts the net token supply which incorporates the burn projections and distribution to dev wallet

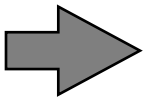
Figure 7.



Token Y will hit its hard cap during 2027 and then become deflationary due to the token burning from borrowing, NFT marketplace and *Token Y*. As the number of transactions increase, the burn rate will increase as more fees are being paid. The *Token Y* model currently assumes the following projections for transaction fee growth rates listed on the left side of **Figure *8.*** The right side doubles the growth rate of token fees on *Token Y's* protocol.

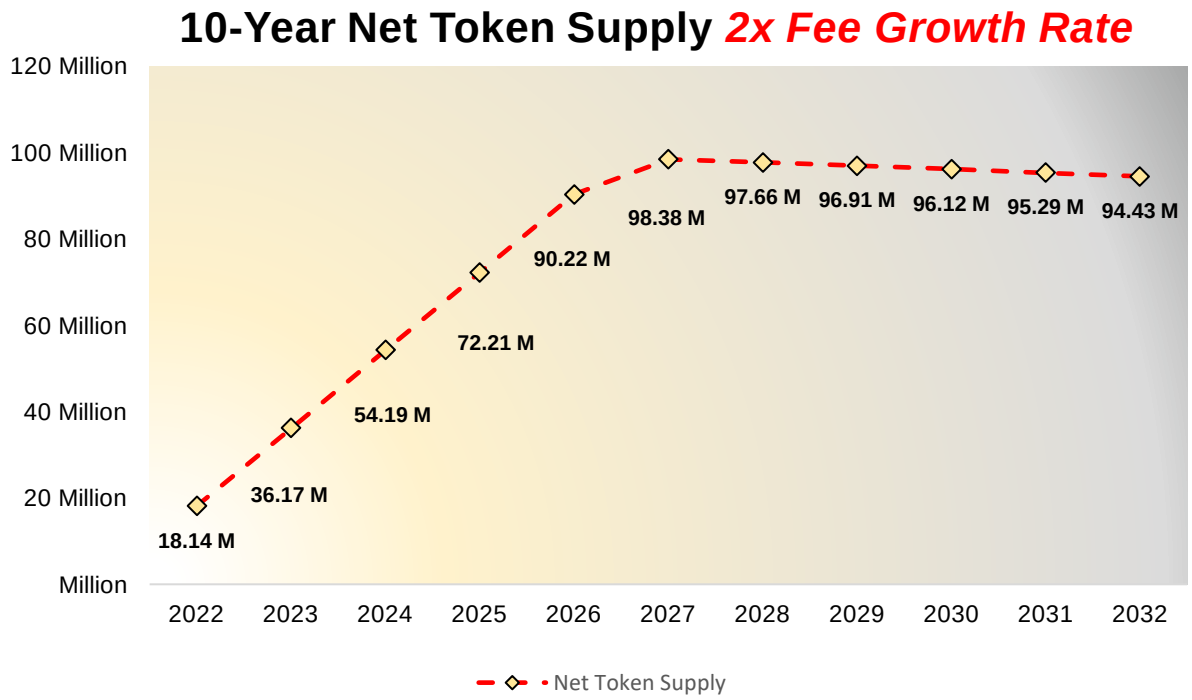
Figure 8

Borrowing fee	
1-5 Growth Rate	5.00%
6-10 Growth Rate	2.50%
NFT	
1-5 Growth Rate	3.00%
6-10 Growth Rate	1.00%
Token Y Swap Fee	
1-5 Growth Rate	5.00%
6-10 Growth Rate	2.50%



Borrowing fee	
1-5 Growth Rate	10.00%
6-10 Growth Rate	5.00%
NFT	
1-5 Growth Rate	6.00%
6-10 Growth Rate	2.00%
Token Y Swap Fee	
1-5 Growth Rate	10.00%
6-10 Growth Rate	5.00%

Figure 9.



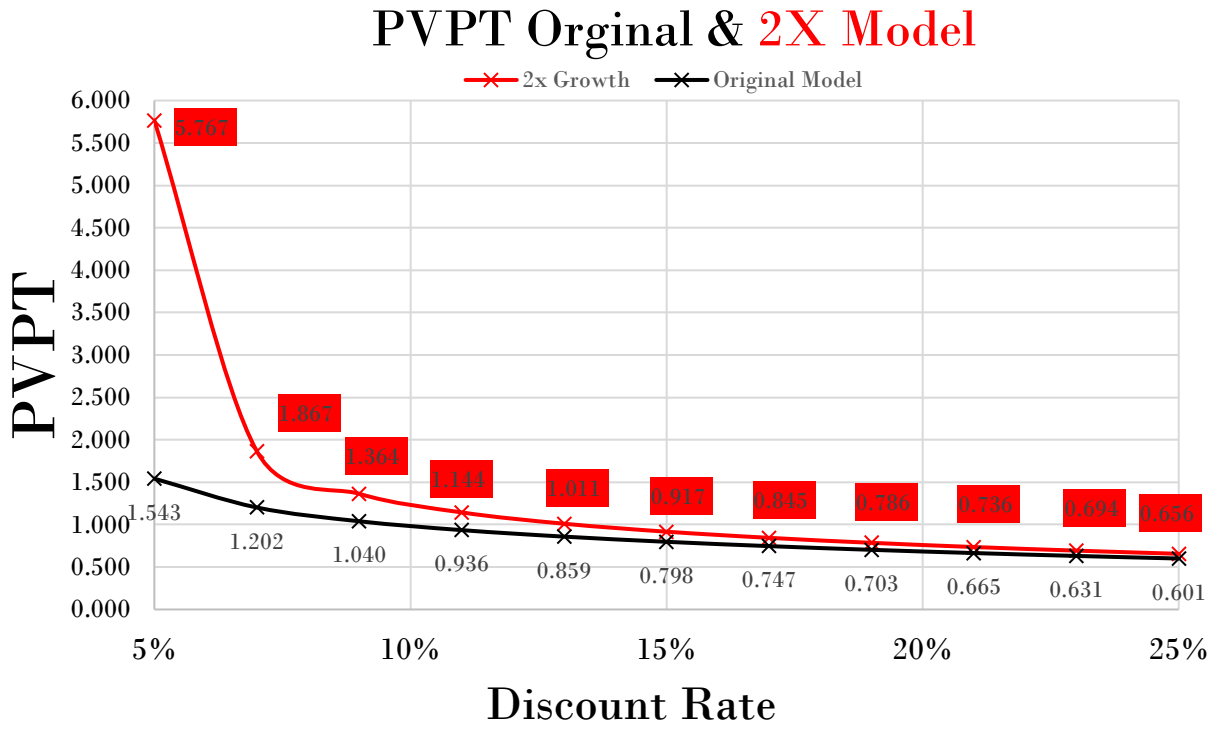
As the projected fees forecast growth rate percentage is increased, the total token supply decreases making the token more deflationary while increasing the PV value of the token. This happens for three reasons. The first is additional token flows added to the model because of the increase in fee totals due to a higher volume of transactions. In the original model's projection, the sum of the PV token flows equates to 70.33 million, while in the 2x model projects 72.37 million in PV token flows. The second reason for the model's growth rate is perpetuity assumption. Both the original model and the 2x model use the growth rate in final year of the 10-year model as its growth rate for the perpetuity function when finding the terminal value. In the original model the token flows grow by 2.26% while in the 2x model the token flows grow by 4.46%. The result of this is the original model has a TV of 19.1 million while the 2x model has a TV of 35.682 million. The third reason is the total token supply's impact on the PV per token (PVPT) rather than the total PV of *Token Y's* token flows. The two models have different net token supply projections, 95.56 million in the original and 94.43 million in the 2x model. When dividing the sum of PV token flows buy a larger number it will decrease the PVPT.

The most intriguing findings from modeling *Token Y* is that at certain discount rates the PVPT can be >1. In traditional finance the PV of a dollar is always <1 due to the nature of a dollar being worth more today vs at some point in the future. However, this is not the case as seen in ***Figure 10.*** In the original model, the PPVT was >1 before a discount rate of 9% and in the 2x model the PPVT was >1 before a discount rate of 13%. This poses a very fascinating theoretical question of having a present value that is worth more in the future.

The plausible reasoning for this phenomenon is the deflationary tokenomic structure of *Token Y* and the other tokens used in this study. In *Token Y's* case let us assume that the 2x model has accurately predicted transaction fee volume and redistribution/burn figures. In the year 2032, the total supply of *Token Y* is 94.43 million. This is 5.57 million or 5.57% of the total number of tokens burnt. Assuming the demand for *Token Y* remains constant, the token should become increasingly valuable due to the decrease in supply. This is important because a Trad-Fi DCF model does not have supply variables in it. This method of discounting focuses on total token supply and relationship with the total token distributions ratio and the total token burn ratio. This relationship is what drives the value of these coins. It operates in a similar fashion to a fixed commodity equation. Let us take a finite supply resource such as oil where in theory no new oil can be created. The total supply of oil is one trillion barrels. Each day two million barrels of oil are consumed or 730 million barrels a year. At this linear rate all the oil will be consumed in 1,369.86 years. If oil consumption increases to three million barrels per day, all the oil will be consumed in 913.24 years. Much like the price of a token, the price of oil should increase due to the increase in consumption. The burn rate or deflation rate is a major factor in pricing reward tokens because it determines the total supply at the end of year 10 which is used to calculate PVPT.

In comparing the original model to the 2x model, two things are apparent. As token transactional volumes increase both *Token Y's* deflation rate and future token flows increase. This leads to a lower token supply and larger total PV of token flows. This results in a higher PVPT in the 2x model vs. the original model.

Figure 10

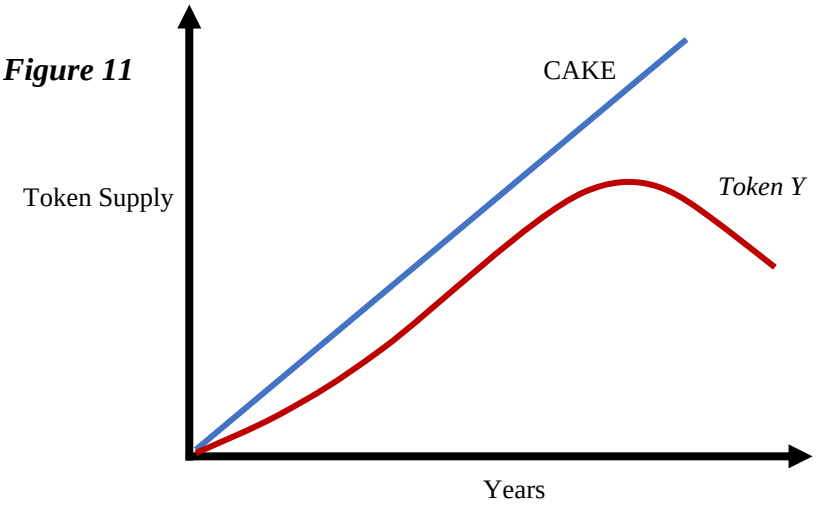


Cake Model

Token Y resembles the tokenomics structure to all the seven coins used in this study. How would a model look like for tokens like CAKE and SUSHI who do not have hard caps and will continue to mint continuously?

CAKE has a daily emission of 1,152,000 tokens but also burns 787,600 tokens per day. This creates an effective net emission of 364,400 CAKE tokens. Because the mechanics of token fees effects are understood from the *Token Y* models, the CAKE model does not incorporate the token fee redistributions and burns. The goal of modeling CAKE token is to understand the effect of not having a hard cap, in relation to a token's valuation. Unlike *Token Y's* deflationary characteristics, CAKE token's, token supply will continue to increase over time. ***Figure 11.*** shows the difference between a deflationary token like *Token Y* and an inflationary token like CAKE. In the CAKE model the token flows remain constant through year 1-10 and into perpetuity.

Figure 11



Like the *Token Y* Models, the CAKE model also assumes a constant 11% discount rate and enters perpetuity after year 10 with a consistent token flow of 133 million CAKE tokens per year. At the 11% discount rate the model found a PVPT of .88. In theory the true PVPT should be higher because the total CAKE supply does not grow truly linear as in ***Figure 11.*** Instead, the supply number at year 10 will be lower because of the burn mechanisms on the Pancake Swap protocol.

PVPT Interpretation

What does PVPT tell about a token's value? First it determines whether the coin will be worth in the future. This is a fascinating concept when the PVPT is >1 because it means that a token should be worth more intrinsically in the future. To conceptualize this, if *Token Y* has a PVPT > 1, *Token Y* today is worth less than a *Token Y* in the future. This is unorthodox because in traditional finance, the value of a dollar is more valuable today than it is in a year or ten years. There are two reasons why a PVPT being >1 will occur. The first is the coin becomes deflationary at some point in the future. This will happen with coins like GAMMA, BWS and XVS because of their hard cap. It is also important to note that tokens like CAKE and SUSHI

could become deflationary even though they are non-hard cap tokens. This would occur when the daily fee volume on these protocols exceeds the net daily emissions. However, The *Token Y* model shows that just because a token is deflationary does not mean it will have a PVPT >1. The second factor in why a tokens PVPT would be >1 is the discount rate applied in the model. In both the CAKE and *Token Y* models, lower discount rates generated PVPTs >1.

Model Drawbacks and PVPT Shortcomings

There are several problems and roadblocks I have identified in modeling both *Token Y* and CAKE. One of the major roadblocks in the entire space is the lack of analytics in relation to the protocols fee figures along with token redistribution/burn figures. It is impossible to model the seven tokens used in this study accurately without these figures. All these protocols have Telegram and Discord chats available. I have been in contact with several of the developers and they say they are working on the analytics piece of this and these figures should become available within the next year. Once these figures come out, the models for these tokens will become more accurate as we will have real figures to work with and not just arbitrary figures like used in *Token Y's* case.

One of the other major roadblocks in this model is the actual meaning of PVPT. PVPT is based off the base token and the tokenomics of that token. What does this exactly mean? PVPT interprets the token value in the future based on the tokenomics of the coin. For instance, let us say *Token Y* has PVPT of .8 based on the original model's projection at a 14.92 % discount rate. In this scenario the PV sum of token flows and the perpetuity value equal 76.46 million *Token Y*. This means that the PV of all future token flows are 76.46 million denominated in *Token Y*. This equates to the PVPT of .80. The real problem with PVPT is that it does not give us a benchmark of what we should pay for *Token Y* because the exchange rate is not included in the model. For instance, if *Token Y* is trading at 10 TKNY/USD it cannot be assumed the fair value is $8. This is because the model is only in terms of *Token Y.* If the spot price of *TKNY* drops to $4 tomorrow or jumps to $13 next week the PVPT is still .8. The only way to find the fair value is to make future projections about the TKNT/USD exchange rate. In traditional DCF models when there are cross currency conversions, yearly futures prices are used. Unfortunately, because this type

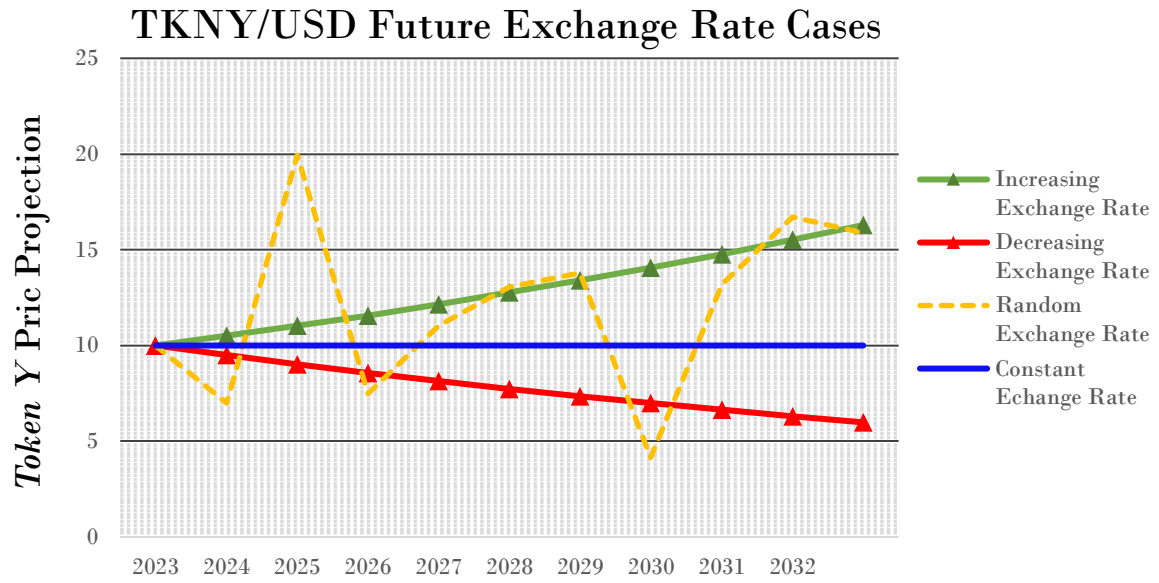


Figure 12

of asset class is so new, futures contracts for these assets do not exist currently. Instead, assumptions must be used. This is not a great method because these assets are extremely volatile, and it is impossible to know what the exchange rate of these assets will be year to year, especially over a ten-year peΩriod. Hypothetically speaking here is what 4 scenarios look like on the *Token Y* original model. ***Figure 12.*** shows the projected price of *Token Y* for a ten-year period.

There are four cases modeled, a bull case, bear case, random case and a price constant case. All of which fall in between a price interval of $1-$20. By assigning conversion rates this gives us a better idea of what fair value and what the investor should pay for the token. The bull case had a PV of $9.84, the bear case had a PV of $6.60, the random case had a PV of $9.09 and as expected the constant case had a PV of $8.00.

The other drawback to PVPT is the token flows cannot be looked at the same way as cash flows from a business are looked at. When evaluating the discounted cashflows of a business, the investor evaluated the cash that will be returned over the course of the business or assets life cycle. This is not the case for a token. Holding a token like CAKE or BSW does not mean one is necessarily going to receive token flows. The PVPT relates to what the protocols economy returns not the individual investor. The protocol reward token system works on supply and demand mechanics, and it is impossible to gauge what an investor will receive when lending and staking.

Token Discount Rate

What should determine the risk premium when discounting token flows? Unlike traditional assets which use CAPM and WACC for a discount rate, the method for discounting crypto asserts is unknown. One of the biggest issues is the concept of risk free in De-Fi. Users can stake stable coins which are pegged to the dollar and earn interest on these tokens. The problem is there are numerous stable coins and all yield different rates. Some of these rates include the reward tokens like the tokens used in this study. For instance, on Venus, DAI can earn 2.33% APY, while USDC earns only 1.88%. On planet finance DAI can earn 5.61% APY, while USDC earns only 7.43%. Does one use the rates listed on Venus or the rates listed on PF? The major issue with the large variance in stable coin rates is how the investor should look at expected returns. For instance, let us assume an investor can earn 10% a year holding BNB. The investor may be more willing to hold BNB if the true risk-free rate is 2.33% or 1.88% percent, vs 5.61% or 7.45%. This is because at the lower rates the investor is compensated more for taking on the additional risk.

One of the other roadblocks in calculating a discount rate for these assets is to identify what should be used for a benchmark index. There are crypto indexes out there such as Bitwise 10 Crypto Fund (BITW) which incorporates coins like BTC and ETH. However, this does not really encompass the De-Fi reward tokens. There is an index called the Defi Pulse Index (DPI) which has tokens like the 7 tokens used in this study. The only drawback is these tokens are all on the Ethereum network but there are some crossovers like SUSHI. With no formidable index and no clear risk-free rate there doesn't appear to be a clear method for finding the discount rate using a method similar to CAPM.

Conclusion

De-Fi assets and protocols are swiftly changing the way people invest, raise capital and store value. There is still so much unknown about the wild west of the financial industry. What drives markets? What gives a token value and how can we value them? What are other risks associated with De-Fi? There are a million questions out there that investors and institutions simply do not know. The goal of this dissertation was to hopefully provide a theory on how investors and institutions can value De-Fi reward token assets. In my findings, the tokenomic structure is an important variable in valuing De-Fi reward token assets. The tokenomic structure of these coins can be used to project future token flows and forecast burn rates. It can be assumed that the tokenomic structure and mechanisms of these tokens do determine their value.

These models are simply ideas and theories about means to value these types of assets. Understandably, there is no perfect way to value these assets as there are issues and shortcomings that are identifiable. The premise behind this dissertation is to establish a foundation and a pathway towards a generally accepted method for valuing these assets. While being unable to find a method for calculating an appropriate discount rate for these token flows, I do believe that there is a method for achieving this. As the analytics improve and become available, more insight as to how to compute a discount rate will become obtainable. With the constant and fast paced development, I have no doubt, there will be a way to value these tokens using this method or a method modified from these models.

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