# A Deep Dive into Peganomics

### What is Peganomics?

Peganomics is a new incentive design that rewards holders proportionally to their conviction in the protocol. To do this, we combine aspects of popular tokenomics designs and novel ideas to create a new system.

## How does it work?

At a high level, Pegasus offers an interest rate perpetual allowing users to speculate on DeFi interest rates like the <u>Aave USDC borrow pool APYs</u>, <u>Curve gauges</u>, <u>Squeeth funding rates</u>, <u>etc</u>. The Pegasus treasury provides ETH as liquidity to the perpetual, and in return, accumulated trading fees are sent back as profit (also in ETH). In short, the Pegasus treasury is the sole yield farmer of the perpetual. Profits are used to back and mint \$PEGA tokens, which are distributed to PegaPal stakers. This should significantly reduce token emissions to short-term profiteers and instead concentrate rewards to high conviction stakers.



**Assets within Pegasus** 

Figure 1. The two assets in Peganomics

## Why do we need Peganomics?

Forkability and token incentives have created races to the bottom in DeFi where protocols compete with each other to offer the best rewards to attract users. Peganomics seeks to break this spiral and create a system for retail DeFi that improves stickiness and long-term viability by:

- Introducing gamification: PegaPal leveling and staking give users a goal and means of progress that any retail user can get started in
- Creating a superior rewards system: The treasury awards payouts sized by each user's level of conviction in the protocol's longevity
- Optimizing for long-term incentives: We are establishing a governance structure that rewards hodlers rather than short-term profiteers

While tokenomics innovation will continue as DeFi matures, we contend this to be a superior model in comparison to current offerings that will prove to be a resolute step forward in the advancement of DeFi incentive designs.

## Why does Pegasus use Protocol-Owned Liquidity?

DeFi 2.0 showed us the shortcomings of mercenary liquidity. Perpetuals by nature are highly capital-efficient thanks in part to leverage — trades can be executed without needing to own the underlying asset itself. By creating a perpetual exchange where the protocol owns its own liquidity, we can improve cash flows by reducing liquidity mining.

Interest rates perpetuals are also a mean-reverting market. As borrow APY increases from more usage of a lending pool, supply APY also increases accordingly. Thus, after a borrowing spike, new suppliers will move in to capture the high APY rate and push the pool utilization rate back to <u>optimal</u>. This significantly de-risks one-sided price movements. Pegasus capitalizes on this by using an AMM-style perpetual which allows even more capital efficiency in terms of required insurance pool liquidity.

## **PegaPals - The Face and Asset of Pegasus**

**Peganomics** uses PegaPal NFTs as the primary token for the Pegasus protocol (see Fig. 2 below). These NFTs can be staked to earn a share of the perpetual's trading fee revenue (paid out in \$PEGA).

PegaPals are special in that hodlers can level them up by burning \$PEGA tokens. Each level requires burning 100 \$PEGA tokens. Thus, when staking a PegaPal, the level of the PegaPal determines the staker's position size in the pool (LVL 1 = 100 \$PEGA staked, LVL 2 = 200 \$PEGA staked, etc).

```
Staked Balance = PegaPal_{level} \times 100
```



Equation 1. Staked balance calculation

Figure 2. Utilities of PegaPals

## **Rewarding Based on Conviction (building on ve-tokenomics)**

Like the <u>ve-model</u>, fusing allows us to use illiquidity to determine a hodler's conviction. High conviction hodlers will burn their \$PEGA in order to level up their PegaPal and increase their share of staking rewards. Since ERC-721s are less liquid than ERC-20s, high-conviction hodlers sacrifice short-term liquidity for more staking rewards.

However, Peganomics improves upon ve- by giving the hodlers the optionality to exit at any time by listing the NFT for sale on the open market. Pegapals can also be fused together to raise levels, meaning buying a level 5 PegaPal would be similar to buying a block of 500 \$PEGA. This can facilitate greater liquidity for PegaPals as users would essentially be buying blocks of discounted tokens to rapidly raise their own PegaPal level. Thus, the market would be left to efficiently price arbitrarily sized \$PEGA lockup positions, something difficult to do in ve-.

	Ve- Model	PEGANOMICS
Filters holders by conviction	By using timelocks for tokens	By using PegaPal leveling
Voting power given to long term holders	Vote power scales by timelock duration	Vote power scales by level
Exit at Anytime	×	Sell your NFT on Quixotic
Easy to price illiquid positions	×	Can be priced as a discounted token position

Figure 3. Summary of Comparison between Ve- and Peganomics

## PegaPal Staking (improving upon 3,3)

Pegasus's staking uses a rebasing mechanism. Rebases are called every 8 hours and staking rewards are paid out in \$PEGA. All \$PEGA is backed by the treasury in ETH. However, profit to fund \$PEGA staking rewards comes from the interest rate perpetual's trading fees.

One major criticism for OHM has been the tight coupling of their revenue with the token price. Selling protocol <u>bonds</u> becomes difficult in the bear market as they become negative EV. Bond buyers are betting on short-term-upwards price action in order to profit from the discount. This creates the "Death Spiral" effect as mass selling lowers prices which results in a lack of revenue from bond sales which shortens APY runway and then triggers another cascade of selling.

However, there are meaningful learnings to obtain from OHM. Primarily, APY is an interesting mechanism to incentivize holding if protocol revenues can be decoupled from the price action. Trading fees are a more reliable revenue stream during bear markets. During a bear market snapshot (12/01-1/01), OHM's revenue fell 80% from \$387 million to \$77 million. Meanwhile, dYdX saw revenue drop 48% from \$78 million to \$40 million (see Fig 4). Granted, OHM seeks to offer a completely different product than Pegasus and this is not a knock on their design. The purpose of this is to show (3,3) can be more sound with less volatile revenue streams. As crypto markets mature, we expect downturns to have even less impact on volume. A look at Trad-fi markets like the <u>Nasdaq</u> confirms this.



*Figure 4: dYdX revenue - Notice despite dips during the present bear market, revenue volatility is not drastic* 

#### **APY Formulas**

$$APY = (1 + rewardYield)^{1095} - 1$$

Equation 2. APY Formula

Equation 3. Reward Yield Calculation: yield per rebase

$$PEGA_{distributed} = PEGA_{totalSupply} \times Reward Rate$$

Equation 4. Supply inflation each rebase to be given out to stakers

The reward rate is a tuneable parameter; PegaPal hodlers will be able to vote on changes. A visualization of how revenues from the interest rate perpetual would flow through to the tiered level model is shown below in Figure 5.



Figure 5. Expected Trading Fee Revenue Flow in a PegaPal Tiered Model

## Fairly Taxing Exits and Raising Opportunity Cost

Exits in traditional (3,3) are particularly easy and value-extractive because DEX swap fees are low (0.3%). On the other hand, NFTs have higher and more flexible royalties. This gives the Pegasus

DAO an additional lever to tune to adjust liquidity. Having a higher royalty allows the protocol to recapture some value on a user's exit to pay back to stakers.

NFTs are also naturally less liquid than ERC-20s. Additionally, the (3,3) model pays out staking rewards proportionally; the fewer people staking, the more of the pie each staker will earn. These two factors drive variance in the time to sell. Thus, a seller will miss rebases while their PegaPal is listed on the open market. And while the seller accumulates opportunity cost, even more rewards will be distributed to each staker.

(1) The flexible royalties and (2) the use of NFTs in Peganomics seek to rebalance the value flow more fairly between hodlers and stakers without limiting the user's ability to exit.

## How Peganomics Naturally Dilutes Short-Term Profit Takers

Since Peganomics uses a linear curve for leveling (as every level costs 100 \$PEGA), even users with larger positions who constantly realize profits will be diluted over time.

As an example: See Figure 6 for a visual representation.

- 1. Assume we have two stakers, Alice and Bob.
- 2. Alice has a PegaPal that is one level higher than Bob's.
- 3. They both stake.
- 4. Alice's staked balance is **200 PEGA (LVL 2)** and Bob's is **100 PEGA (LVL 1)**. Thus, each person's share of the total staked is 66.66% and 33.33% respectively.
- 5. Since rebase rewards are distributed proportionally to the amount staked, if the next rebase distributes 100 PEGA, Alice will receive 66.66 PEGA and Bob will receive 33.33 PEGA.
- 6. However, Alice decides she wants to realize some profits since she earned more tokens. She sells 33 of her PEGA earnings and leaves the remaining 33 staked.
- 7. Bob leaves all 33 of his PEGA earnings staked.
- 8. Now, Alice has a staked balance of 233 PEGA, and Bob has a balance of 133 PEGA.
- However, Alice's share of the total amount staked is now only 63%, it has fallen by 3%, and Bob's share is now 36.3%, a gain of 3%.
- 10. Thus on the next rebase Alice will receive  $\sim 3\%$  less and Bob  $\sim 3\%$  more.

- 11. As we can see if Alice continues to sell, eventually she will be diluted out and Bob will gradually eat more of her share.
  - a. If Alice does not sell, we see from the middle "After Rebase" table in Figure 5, her share will remain the same.
- 12. The primary implication of this is that it's difficult to reform positions once exited, as it requires leveling a PegaPal. Thus, Alice can only avoid dilution by hodling.



Figure 6: Visualization of Alice being diluted for selling

## **One-Shot Liquidity**

Peganomics also favors high-conviction hodlers by making their long-term positions more liquid. This is done via **"One Shot Liquidity".** This term originates from staking in Pegasus auto-compounding, but not auto-leveling. Thus, the longer you stake, the more your balance will be comprised of liquid ERC-20 \$PEGA.



Figure 7: Visualization of One-Shot Liquidity

For example: If a user stakes a Lvl 1 PegaPal, equal to 100 \$PEGA tokens, and earns rewards until they have a position of 1000 \$PEGA (~ Lvl 10 PegaPal), when they unstake, they will receive their Lvl 1 PegaPal + 900 \$PEGA. This gives them **one shot** to then exit the protocol by selling the more liquid \$PEGA tokens on the market. Later on, if they try to reform their previous staked balance of

1000 \$PEGA they must repurchase those assets and level up their PegaPal, creating an illiquid position.

## **One-Shot Liquidity in Bear Markets**

One-Shot Liquidity has interesting implications during the bear market. Unfortunately, the number can't always go up, and prices will inevitably go down as speculators sell. In traditional (3,3), price drops of 50% value can occur in the course of a one-month span (see OHM Nov 15 - Dec 15). During this time, price drops outpace APY earnings (see Figure 8 below). Thus, the optimal strategy for those who entered early is to realize profits and wait to re-enter lower. This compounds the expected bear market sell pressure from speculators and creates even more downwards price pressure.

*Visualization of this below with parameters of 3800% APY, and a 50% price drawback, similar to market conditions in the current bear cycle. Note in extreme cases with APY >100,000% hodling could still be profitable, but APY will unlikely be that high in mature markets.* 

	Balance	Reward Yield	Rebase Earnings (Token)	Price (\$)	Balance Loss (\$)	Token Earnings (\$)	Net Position (\$)
Epoch	100	0.00343	0	99.78021978			
1	100.343	0.00343	0.34	99.29	49.62	34.06	-15.57
2	100.6871765	0.00343	0.34	98.79	49.79	34.00	-15.79
3	101.0325335	0.00343	0.35	98.30	49.96	33.95	-16.01
4	101.3790751	0.00343	0.35	97.80	50.13	33.89	-16.24
5	101.7268053	0.00343	0.35	97.31	50.30	33.84	-16.47
6	102.0757283	0.00343	0.35	96.81	50.48	33.78	-16.70
7	102.425848	0.00343	0.35	96.32	50.65	33.72	-16.93
	:		:	:		:	
83	132.8702458	0.00343	0.45	58.74	65.71	26.68	-39.03
84	133.3259907	0.00343	0.46	58.24	65.93	26.54	-39.39
85	133.7832989	0.00343	0.46	57.75	66.16	26.41	-39.75
86	134.2421756	0.00343	0.46	57.25	66.38	26.27	-40.11
87	134.7026262	0.00343	0.46	56.76	66.61	26.13	-40.48
88	135.1646562	0.00343	0.46	56.26	66.84	26.00	-40.84
89	135.628271	0.00343	0.46	55.77	67.07	25.86	-41.21
90	136.093476	0.00343	0.47	55.27	67.30	25.71	-41.58
							-2473.340904

#### Losses from Holding During a Bear Market

Figure 8: Losses outpace APY gains in bear markets, so the optimal strategy is to sell.

One-Shot Liquidity makes buying in for believers during a bear market a viable decision. If a user accumulates more positions during the bear market and stakes, they will have a significantly more liquid position during the bull market to realize profits. This is because speculators will always look

to capture massive APY upside when the market is rising and are more willing to level and create illiquid positions (see earnings in Fig. 9).

	Balance	Reward Yield	Rebase Earnings (Token)	Price (\$)	Balance Loss (\$)	Token Earnings (\$)	Net Position (\$)
Epoch	135.628271	0.00343	0	54.78021978		0.(1)	
	1 136.093476	0.00343	0.4652049935	55.27472527	-67.29897165	25.71407821	\$93.01
	2 136.5602766	0.00343	0.4668006227	55.76923077	-67.52980712	26.03311165	\$93.56
	3 137.0286784	0.00343	0.4684017488	56.26373626	-67.76143436	26.35403246	\$94.12
	4 137.4986867	0.00343	0.4700083668	56.75824176	-67.99385608	26.67684851	\$94.67
	5 137.9703072	0.00343	0.4716204955	57.25274725	-68.22707501	27.00156903	\$95.23
	6 138.4435454	0.00343	0.4732381538	57.74725275	-68.46109387	27.32820328	\$95.79
	7 138.9184067	0.00343	0.4748613607	58.24175824	-68.69591542	27.65676057	\$96.35
	:		:	:		:	
8	3 180.209617	0.00343	0.6160060856	95.82417582	-89.11464579	59.02827545	\$148.14
8	4 180.827736	0.00343	0.6181189864	96.31868132	-89.42030902	59.53640567	\$148.96
8	5 181.4479752	0.00343	0.6202391346	96.81318681	-89.72702068	60.0473272	\$149.77
8	6 182.0703417	0.00343	0.6223665548	97.30769231	-90.03478436	60.56105322	\$150.60
8	7 182.694843	0.00343	0.6245012721	97.8021978	-90.34360367	61.07759694	\$151.42
8	8 183.3214863	0.00343	0.6266433114	98.2967033	-90.65348223	61.59697166	\$152.25
8	9 183.950279	0.00343	0.628792698	98.79120879	-90.96442368	62.11919071	\$153.08
9	0 184.5812285	0.00343	0.630949457	99.28571429	-91.27643165	62.64426751	\$153.92
							10920.74012

#### Gains During a Bull Market

Figure 9: Gains from a bull cycle, however, the bear market hodler is much more liquid

In the example above, a hodler through the bear cycle will have 1 PegaPal and ~80 \$PEGA as their staked position after 90 rebases. Note that \$PEGA is a more liquid ERC-20. A speculator who sold the dip and is looking to restake must buy a PegaPal. This means they will begin earning APY with 1 PegaPal (of any level) and no \$PEGA, so accumulating a liquid position will require time. During an upswing, a bear market hodler will have a higher percentage of the position in the more liquid \$PEGA (see Fig.10 below).



Figure 10: A bear market hodler is rewarded by being much more liquid early on in a bull cycle.

## **Using Peganomics to Improve Trading Rewards**

Perpetual exchanges have become wildly successful in DeFi. However, retail traders lose on both sides as sharks beating them on trades are also trading more volume and earning more rewards which are then dumped on the market. This creates a poor experience for retail and has a negative effect on the token price (see Fig. 11). Peganomics gradually filters out dumpers from APY earnings and encourages hodling, which can protect the earnings of retail traders.



Figure 11: dYdX token price since launching incentives in September. Due to constant reward emissions and similar trading volume, a nonlinear decrease in price suggests dumping

Pegasus also leans on the idea that NFTs are easy to understand and DeFi has considerable utility. By combining them together, we are able to create Peganomics, a gamified system for retail traders to feel both progress and purpose. Their goal explicitly is to level up as much as possible to earn more APY. This adds an RPG-style progression system to the protocol, leading to feelings of mastery and accomplishment.

#### **Peganomics Governance Incentives**

Traditional token voting models have incentive schemes that often optimize for maximizing short-term profits as opposed to building long-term utility. Peganomics aims to address this by having governance in Pegasus conducted via PegaPals. In order to incentivize leveling and reduce the

effect of Sybil attacking governance,<sup>1</sup> Peganomics seeks to introduce convexity to governance via power scaling.



Figure 12: Mapping Power Scalings for Voting Power by Level

Users who have the highest level PegaPals will have the greatest influence on the protocol. These users are optimizing for staking rewards rather than short-term profits; as they hold larger and more illiquid positions, the largest voters have their incentives aligned towards maximizing long-term value. Note, however, that when scaling is too aggressive  $x^2$ , new members will be unable to participate in governance, which is also not ideal (see Fig. 12 above). Thus we seek to target a scaling range around  $x^{1.5}$ .

To demonstrate this mechanism's benefits, consider a vote on setting the royalty for PegaPals. Speculators often outnumber high conviction hodlers during a bull cycle. In traditional voting, speculators would seek to lower royalties for an easier exit during a downturn. However, high conviction hodlers would prefer to keep royalties high as this would increase revenue and extend APY runway during a bear market scramble. In Pegasus, high-conviction hodlers would have more vote power (Fig. 12), and so the vote would favor the latter.

Pegasus governance is also more resistant to manipulation. A whale cannot buy a large share of tokens, vote, then dump. They must instead accumulate large positions of PegaPals which introduces

<sup>&</sup>lt;sup>1</sup> See Appendix for Details on Incentivizing Leveling and Reducing Sybil Attacks

more risk due to their illiquidity. If a whale attempts to still move forward with accumulating large positions, high-conviction stakers could take advantage of the upwards price movement, due to their more liquid position from One-Shot Liquidity by realizing a profit and re-entering later.

#### **Peganomics In Action**

At Pegasus, we're not just about crafting theory. We are actively putting these ideas to the test. To bootstrap liquidity for our perpetual, we are currently auctioning off PegaPals that can be immediately staked. We think Peganomics is an important step forward in further iteration towards better DeFi tokenomics models. If you find this model interesting or want to get involved, hop into an auction and join our <u>Discord</u>. We look forward to seeing you in the Pegaverse.

See this in production!

Auctions Link https://auctions.pegasusfinance.xyz/

## Appendix

#### **Incentivizing Leveling**

<u>Minmaxers</u> might seek to optimally participate in Peganomics by staking Lvl 1 Pegapals across many accounts to increase their "net" level while maximizing liquidity. In the short term, we expect this to be addressed by PegaPals trading at a premium to their 100 \$PEGA token value. This is because they can be staked to earn revenue. Thus, early on, the cheapest way to increase one's share of protocol revenue will still be by leveling, see Fig. 13.



Figure 13: Expected Premium per Stake Size. (For easy visualization assume PEGA trades at \$1)

Moreover, it's not guaranteed that separate PegaPals will always yield a positive EV. During a bull market, speculators will flood in seeking to capture high APY. Buying separate PegaPals to increase their staked position size will require paying an upfront premium as buy pressure for PegaPals would be high from others also looking to capitalize on the APY. At this time, a user leveling by burning tokens might have a positive EV by selling their PegaPal, as the demand for PegaPals will significantly reduce the illiquidity discount normally incurred. However, since discounts and premiums fluctuate with market conditions and sentiment, the EV can vary. The goal of this though is to show that under the right timing both strategies can yield positive EV.

Planned features include offering trading fee discounts on the perpetual according to level, and APY boosts for trading. These bonuses in addition to governance scaling will seek to further incentivize users to level rather than staking many separate PegaPals across accounts.

### **Incentivizing Fusing**

Looking more towards the long term, Peganomics will incentivize the consolidation of positions via fusing boosts. This will allow us to introduce one-time convexity to encourage leveling and fusing without affecting the paper-hander dilution of Peganomics.

The bonus levels for fusing two PegaPals A and B would be calculated by:

$$Level Boost_{(a,b)} = 0.10 * min_{level(a,b)}$$

Equation 5: Level bonus for fusing based on the min level of the two fused PegaPals

An example application:

- Two PegaPals: A = level 30, B = level 20.
- Take min(A,B) = level 20
- Boost = 20 \* 0.1 = 2 levels
- Fuse(A,B) = 30 + 20 + 2 = Level 52 PegaPal

Taking the min level will incentivize users to buy higher-level PegaPals on the open market,

improving liquidity. One tradeoff with this model is that bonus levels would need to be bracketed in ranges of 10 levels to maintain the ratio of 100 tokens per level.

Min PegaPal Level	Bonus Levels from Fusing
1-9	0
10 - 19	1
20-29	2
30-39	3

Figure 14: Bonus Levels from Fusing PegaPals by Level Brackets

This feature will continue to be studied and discussed by the community. As level distributions begin to normalize more data will allow for better parameter tuning for deciding fusing bonuses.

## **Reviewers:**

Max: https://twitter.com/maxdigi14 Shan: https://twitter.com/rshanreddy Ren: https://twitter.com/0xren\_cf Kydo: https://twitter.com/0xkydo NatFacts: https://twitter.com/NatFactsEth FourPoops: https://twitter.com/fourpoops Ricardao: https://twitter.com/the\_ricardor Dilip: https://twitter.com/dasattack Nick: https://twitter.com/bax1337 Matt: https://twitter.com/0xkatz Bowen: https://twitter.com/Bowenddex Dan: https://twitter.com/mikleinad Jack: https://twitter.com/hhjacks Alpin: https://twitter.com/0xalpo Jmak: https://twitter.com/jonathanjmak