

Alpaca Finance

Fair-launch leveraged yield farming protocol on Binance Smart Chain



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1 Summary

Alpaca Finance is the largest lending protocol allowing leveraged yield farming on Binance Smart Chain. It helps lenders to earn safe and stable yields, and offers borrowers undercollateralized loans for leveraged yield farming positions, vastly multiplying their farming principals and resulting profits.

Furthermore, Alpacas are a virtuous breed. That's why, we are a fair-launch project with no pre-sale, no investor, and no pre-mine. So from the beginning, this has always been a product built by the people, for the people. Or as we like to say: **by the Alpacas, for the Alpacas.**

2 Introduction

Alpaca – what a majestic animal! We can't think of a better mascot to represent our ethos.

- Alpacas love to live in the mountains at high altitudes... **They will make your farming yields sky-high once you become their friend.**
- Alpacas come in 22 gorgeous colors... **We will offer many farming pools for you to choose from.**
- Alpacas are green animals; they have a very light carbon footprint, and 95% of their wool is usable... **Sending transactions on BSC is incredibly efficient and will cost you much less gas than on other chains, maximizing your yields.**
- Alpacas do not bite, and lack sharp teeth... **Everything about our project is transparent and verifiable; there will be no rug pull!**
- Alpacas are a great investment; they're inexpensive to raise, require small acreage, and provide a regular supply of wool... **Our protocol's leveraged positions will allow you to amplify your profit potential, providing higher yields on less capital.**

Alpacas are truly an investment you can hug... you'll be glued to your screen watching your profits continuously grow!

2.1 What is yield farming?

Yield farming is an innovative DeFi concept where users stake or lend their crypto assets in order to receive returns.

2.2 Why did we build Alpaca Finance?

Pioneered by Compound during the DeFi Summer, yield farming on Ethereum has become a widespread method for projects to bootstrap their liquidity and acquire new users. However, as of late, the rising costs of the process have become more and more prohibitive for the majority of people. In fact, Ethereum has become a whale game because the gas fees are just too damn high!

As a result, Binance Smart Chain (BSC) has experienced an exponential boom in popularity, and in this emerging ecosystem, we noticed a gap amongst the applications offered there compared to other chains such as Ethereum. To be specific, one of the largest missing pieces—was an on-chain leverage protocol!

Thus, Alpaca Finance was born, seeking to provide value to the BSC community through leveraged yield farming.

3 Our Protocol

As a user, you can participate in Alpaca Finance in three different ways:

Lender: You can earn safe and stable returns on your base assets by depositing them into our lending vaults. These assets are then offered to yield farmers for leveraging up their positions.

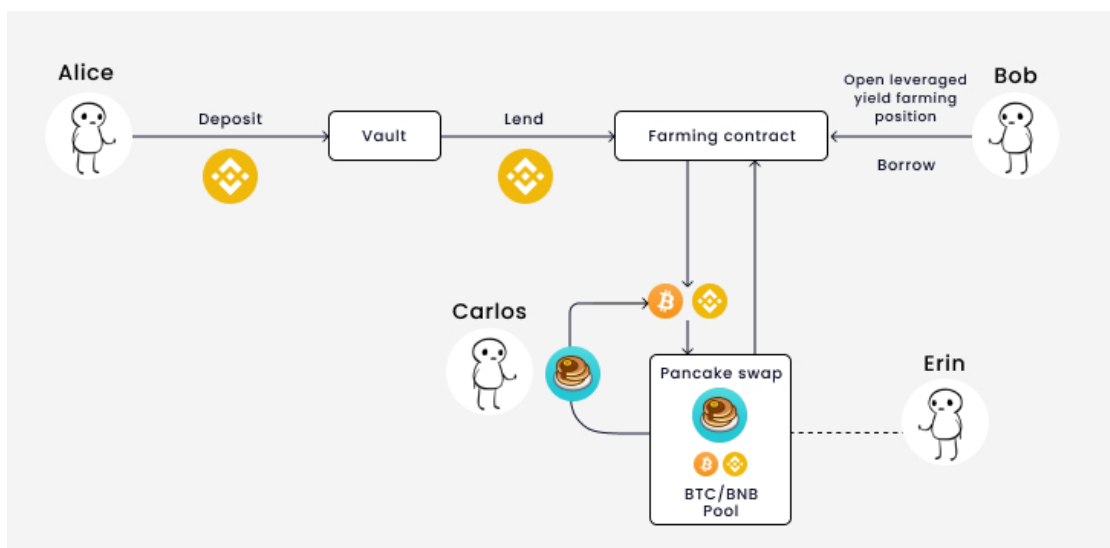
Yield farmer: You can borrow base assets from our lending vaults, allowing you to open a leveraged farming position, multiplying your farming APR by up to 6x(minus borrowing interest). Of course, these higher yields come with larger risks than lending: liquidation, impermanent loss, etc.

Liquidator: Monitors the pool for underwater leveraged farming positions(when equity collateral becomes too low, thus approaching risk of default) and liquidates them. (Bots only)

We currently support the following base assets:BNB, BUSD, ETH, and will soon add ALPACA and BTCT. Our available leveraged farming is integrated with PancakeSwap and will soon be integrated with VaultSwap.

In this example below, we show how each participant works together in our ecosystem:

- **Alice the lender** deposits her BNB into our lending vault, and receives ibBNB: an interest-bearing asset representing her shares of BNB in the lending vault. Her BNB then becomes available for a yield farmer to borrow. Meanwhile, Alice's ibBNB accrues interest internally, which she can withdraw for more BNB than the amount she deposited (representing principal BNB + interest).
- **Bob the yield farmer** wants to open a leveraged yield farming position on the BTC/BNB pair; he borrows BNB from the vault and enjoys higher yield farming rewards. Alpaca Finance's smart contract takes care of all the mechanics behind the scenes :optimally switching assets to the right ratio, providing liquidity to the pool, and staking the LP tokens for Pancake Rewards.
- **Erin the liquidator bot** monitors the health of each leveraged position, and when it goes beyond designated parameters, she helps liquidate the position, making sure lenders such as Alice do not lose their capital. For this service, she takes a 5% reward from the liquidated position. At Alpaca, we also have an in-house bot for this which uses 100% of this fee for a buyback and burn of the ALPACA token. So even if you're unfortunate and have your position liquidated, if you're an ALPACA holder, you can feel relieved knowing your token is going up in value as a result.
- **Carlos the bounty hunter bot** monitors the amount of rewards accrued in each pool and helps reinvest it back, compounding returns for all farmers. For this service, he takes 3% of the reward pool, which goes to the dev fund to pay for operations. (In-house bot only)



4 Tokenomics & Token distributions:

Alpaca Finance is a fair launch project with no pre-sale, no investor, and no pre-mine. Similar to many fair launch projects, we will reward various participants that help bootstrap our ecosystem. This will be the only way to earn ALPACA tokens.

4.1 What is the ALPACA token used for?

4.1.1 Governance

We will soon launch a governance vault that will allow community members to stake their ALPACA tokens; stakers will receive xALPACA where 1 xALPACA = 1 vote, allowing them to decide on key governance decisions.

4.1.2 Capture Economic Benefits of the Platform

We will let the community decide how they want the economic incentives to be captured by the ALPACA token; For example, it could be similar to Sushiswap where x% of fees generated go to perform token buyback and burn. In fact, upon launch of leveraged yield farming, there will already be several mechanisms in place making ALPACA deflationary in nature.

4.1.3 Accrue Value Through Deflation

Deflationary mechanisms for ALPACA:

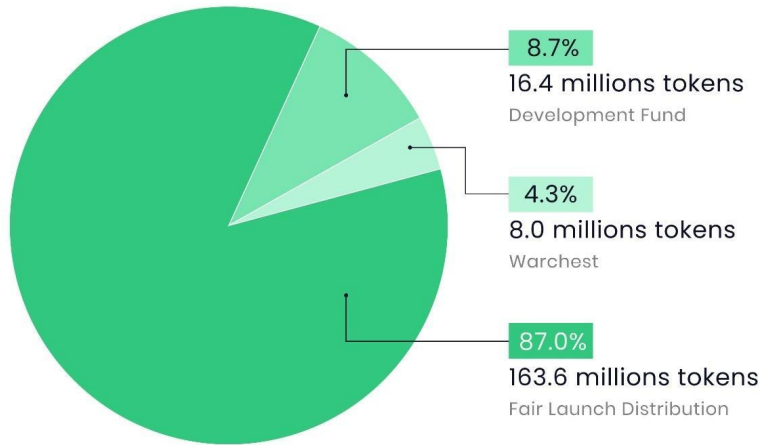
- Every time our liquidation bot liquidates a leveraged position, it receives 5% of the position's value as a fee. 100% of those fees will go towards buybacks and burns of the ALPACA token.
- When a borrower takes out a loan of tokens in order to engage in leveraged farming, they pay a fee to the lender in interest. 10% of that interest will go towards the protocol fee, of which half(5%) will be used on buybacks and burns of the ALPACA token.

Why have we chosen to go with token burn instead of direct fee distribution? Because burn is also a method of fee distribution, only it's more efficient at increasing token price. Burn directly lowers available supply which increases the value of the remaining tokens. Instead of giving out protocol earnings as yields that users can, and often do, dump on the market, through burn, these earnings embed into the token price itself, which discourages selling because users would have to sell part of their principal. This is a more effective way of both rewarding long-term holders, and creating them.

4.1.4 Protocol Utility

ALPACA tokens will be a fundamental part of future initiatives providing protocol utility. In particular, we're planning an NFT integration that will require ALPACA tokens to participate, and will offer benefits relating to various aspects of leveraged yield farming such as higher available leverage level, higher lending rates for lenders, lower lending rates for borrowers, and more.

4.1.5 ALPANomics



4.1.6 Fair Launch Token Distribution

87% of our total supply will be distributed to the users of the protocol—a genuine fair launch, with less than 9% of the tokens vesting to the team over a two-year period. Over these two years, ALPACA will be released with a decaying emissions schedule. In total, there will be **188 million ALPACA**. To incentivize early adopters, there was a bonus rewards period for the first two weeks.

Below is our planned block reward schedule. Based on it, the circulating supply profile of ALPACA can be plotted. Please note that although it is also monthly like the Stronk schedule, the below schedule advances periods at the beginning of the month, whereas the Stronk schedule does so in the middle of the month.

Block Rewards Schedule

Period	Tokens / block	Period	Tokens / block
April 2021	22.00	April 2022	1.65
May 2021	19.80	May 2022	1.65
June 2021	16.50	June 2022	1.65
July 2021	13.20	July 2022	1.65
August 2021	8.80	August 2022	1.65
September 2021	6.60	September 2022	1.10
October 2021	4.40	October 2022	1.10
November 2021	2.75	November 2022	1.10
December 2021	2.75	December 2022	0.55
January 2022	2.20	January 2023	0.55
February 2022	2.20	February 2023	0.55
March 2022	2.20		

Please note that the inflation rate drops off dramatically after the initial periods. In fact, the inflation rate will fall under 5% after July 2021.

4.1.7 Development Fund

8.7% of the distributed tokens will go towards funding development and expanding the team, and will be subject to the same two-year vesting as the tokens from the Fair Launch Distribution.

4.1.8 Warchest

There is an allocation of 8 million tokens reserved for future strategic expenses. These include listing fees, audits, third-party services, liquidity for partnerships, etc. 250,000 of these tokens were used to seed PancakeSwap's ALPACA-wBNB pool. To avoid dilution to token holders, we've also implemented a restriction. No more than 200,000 tokens (~2.5% of the 8 million) can be withdrawn each month, with the only exception being if there is prior approval from a community vote.

ALPACA token address: [0x8f0528ce5ef7b51152a59745befdd91d97091d2f](https://www.bscscan.com/address/0x8f0528ce5ef7b51152a59745befdd91d97091d2f)

4.2 ibTokens

4.2.1 What are ibTokens?

- When a user supplies their assets to Alpaca Finance's lending pools, ibTokens (interest-bearing Tokens) are used to keep track of the funds they have deposited as well as any interest earned.
- Each time a user supplies funds to the lending pool, they are issued a corresponding balance in ibTokens. This balance of the ibTokens is directly proportional to the stake they have in the lending pool, which accrues interest every block.
- Each lending pool has its own ibToken; for example, if a user lends BNB to the protocol, they will receive a corresponding balance of ibBNB.

4.2.2 How do ibTokens earn interest?

- Each deposit vault earns interest. However, the interest isn't distributed. Instead, simply by holding ibTokens, you'll earn the interest.
- ibTokens accumulate interest through their exchange rate; over time, each ibToken's value increases, becoming convertible into a larger amount of its underlying asset with every block, even while the number of ibTokens in your wallet stays the same.
- Each deposit pool has its own utilization which will also reflect how much the corresponding ibTokens will appreciate over time.
- The longer a user holds ibTokens, the higher the value of those tokens appreciates. This is the accumulation of interest.
- You do not need to stake ibTokens to enjoy this price appreciation, although you will still earn it while your tokens are staked.

4.2.3 Do I need to calculate the ibTokens exchange rate?

When Alpaca Finance was launched, the ibToken exchange rate (ie. how many BNB one ibBNB was worth) began at 1. Since the launch of leveraged yield farming though, it has continued to increase at a rate equal to the compounding market interest rate. This represents the accrual of the lending fees to lenders' tokens.

For instance, if the lending APY for a year was an average of 50%, the value of the ibToken at the end of the year would be ~1.5.

Each user has the same ibToken exchange rate; there's nothing unique to your wallet that you have to worry about.

4.2.4 Example

Let's say you deposit 1,000 BNB in our vault when each ibBNB is worth 1.05 BNB, you would receive 952.38 ibBNB ($1,000 / 1.05$)

A few months later, you decide it's time to withdraw your ibBNB from the vault, when the exchange rate is 1.10. The following will occur:

- Your 952.38 ibBNB is now equal to 1,047.618 BNB ($952.38 * 1.10$)
- You could withdraw 1,047.618 BNB, which would exchange all 952.38 ibBNB
- Or, you could withdraw a portion, such as your original 1,000 BNB, which would redeem 909.09 ibBNB (keeping 43.29 ibBNB in your wallet)

Our implementation of ibTokens is similar to that of the cToken of Compound protocol. For more information on cTokens, please visit: <https://compound.finance/docs/ctokens>

4.3 Pool Allocations

We allocate ALPACA emission to various stakeholders on our platform. We adjust the allocation points from time-to-time to align incentivization with strategic goals of the project.

4.3.1 Current Rewards distribution

Emission rate: **19.366 ALPACA / block**

Pool	Allocation points	ALPACA / block
Deposit Pool: ibALPACA	100	1.20
Deposit Pool: ibBNB	200	2.40
Deposit Pool: ibBUSD	150	1.80
Deposit Pool: ibETH	100	1.20
Deposit Pool: ibUSDT	200	2.40
Pancakeswap ALPACA-BNB LP	100	1.20
Leveraged position from ibALPACA pool	25	0.30
Leveraged position from ibBNB pool	300	3.60
Leveraged position from ibBUSD pool	125	1.50
Leveraged position from ibETH pool	100	1.20
Leveraged position from ibUSDT pool	100	1.20
sALPACA	113	1.36
Total	1,613	19.37

5 Roadmap

The sky is (not) the limit!

(**Updated 5/28/2021)

Below, you'll find Alpaca's roadmap, but first, we'll share with you our high-level goals for Alpaca Finance in 2021:




- I. Establish the most comprehensive and advanced leveraged yield farming ecosystem with highly-composable features, integrating with the top AMMs and protocols across BSC.
- II. Increase the ALPACA token's long-term value and utility within our ecosystem through additional deflationary mechanisms and protocol use-cases, as well as across the DeFi-space through

- accelerating marketing and business development activities (partnerships, cross-platform lending, CEX listings, etc).
- III. Optimize protocol security and robustness through audits and the addition of multi-sig.
 - IV. Implement NFT campaigns leveraging Alpaca's unique branding, and integrate those NFTs with platform features that improve engagement, deliver genuine utility, and offer increased yields.
 - V. Establish Alpaca Finance as a foundational layer in the DeFi landscape through horizontal and vertical protocol integrations, unmatched composability and leverage offerings, and cross-chain expansions.

5.1 Q1 2021:

- ✓ Fair Launch ALPACA token
- ✓ BUSD and BNB single-asset staking vaults
- ✓ ALPACA/wBNB PancakeSwap LP staking vault
- ✓ Stronk Vault and sALPACA(experimental synthetic with futures+bond elements)
- ✓ Complete Audits with PeckShield and Certik
- ✓ Launch Leveraged Yield Farming with auto-compounding new vaults, providing leverage on popular PancakeSwap pools
- ✓ Token Value Expansion – add buyback and burn mechanisms to make ALPACA long-term deflationary (more explained below)
- ✓ Launch Liquidation Bot (Although liquidation will still be possible for external parties to avoid centralization and single point of failure, we'll have an in-house liquidation bot that should be faster). 100% of the 5% liquidation fee will go towards ALPACA buyback and burn (first deflationary mechanism, implemented on LYF launch)
- ✓ 50% of the 10% interest rate fee for borrowing/leveraged farming will be used on ALPACA buyback and burn. This means half of the leveraged farming fees will go towards token holders in the form of burn (second deflationary mechanism, implemented on LYF launch)

5.2 Q2 2021:

- ✓ Provide ability to add liquidity to pools directly on our platform
- ✓ Integrate with more PancakeSwap pools
- ✓ CEX listings (3/? completed)
- ✓ Featured Leveraged Pools Program - Develop partnerships to provide leverage to BSC projects.
-  Launch new single-asset deposit vaults for borrowing and lending
 - ✓ ETH
 - ✓ ALPACA
 - ✓ USDT
 -  BTCB (1 June 2021)
- ✓ Add ALPACA-paired leveraged yield farming pools
- ✓ Grazing Range Pools: users will be able to stake ibALPACA to farm the tokens of partners in the Featured Leveraged Pools Program
- ✓ Alpaca's first NFT campaign
- ✓ Allow borrowing of either asset in a pool, permitting powerful shorting and hedging strategies
-  Partner with more projects to build off our protocol by extending off our vaults and the ALPACA token. For example, incentivizing others to create more ALPACA staking vaults.
- Integrate transaction routing to external protocols for minimizing price impact when opening/closing leveraged yield farming positions.
- Add support for additional web and mobile wallets(TokenPocket, Math Wallet, WalletConnect, FortMatic, Portis, Trust Wallet, Binance Chain Wallet, etc.)
- AUSD - Allow staking ibTOKENS(ibBNB, ibALPACA, etc.), and using them as collateral to mint AUSD(ALPACA-USD), a crypto-backed synthetic stablecoin.

5.3 Q3 2021:

- Allow AUSD to be used as collateral for leveraged yield farming for any pool in Alpaca.
- Partner with protocols to adopt AUSD
- Integrate with more AMMs to add new pools
- Add multi-sig to upgradable proxy contracts
- Implement Governance
- Add ability to use LP tokens as collateral to open leverage yield farming positions
- Add more utility to ALPACA token within our protocol (lower fees/borrowing rates, ability to open higher leverage)
- Partner with other protocols to accept ALPACA and our ib synthetic tokens as collateral
- NFT Utility Integration (not only NFTs but ones that integrate with leveraged yield farming)

5.4 Q4 2021:

- Implement additional yield-generation methods for our Vault deposits beyond leveraged yield farming (strategies during under-utilization)
- Extend the sequence of leverage and composability of the protocol by creating new synthetics for untapped protocol assets (ie. synthetics for the staked LPs in our vaults)
- Augment the lending power of the protocol. Allow external parties to borrow from our deposit vaults.
- Expand Alpaca's services to other blockchains

The list above may not be 100% comprehensive (we don't want to leak too much alpha here.) but rest assured that we're working tirelessly to grow Alpaca Finance to become the #1 on-chain leverage protocol on BSC, and someday--more.

In addition, we always love to hear suggestions and ideas from our community members, so please [join our Discord](#) and make your voice heard!

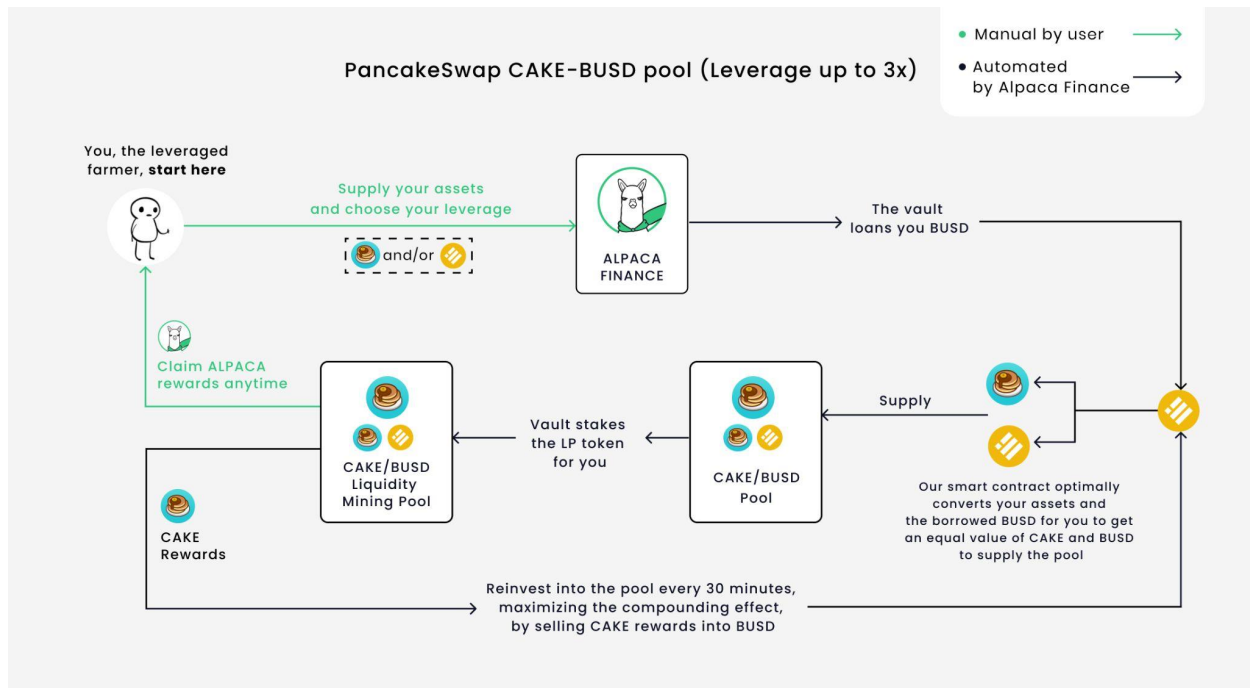
6 Strategies

Alpaca Finance deploys strategies that work to achieve the highest possible yields for our farmers. We also want to make sure our users have the best experience when interacting with our platform. That's why we've simplified the leveraged farming process by automating many things behind the scenes.

Some of our key features for enhancing usability are:

- **Flexible deposit options:** our vault optimally converts your deposited assets and the borrowed BNB or BUSD to get an equal value-split to supply the farming liquidity pool. So for example, for the CAKE/BNB pool, you can deposit any amount of CAKE and/or BNB to start farming without having to do the conversions yourself.
- **Automatic staking:** our code stakes the LP tokens for you on the chosen platform(PancakeSwap, etc.) automatically, so you can start earning rewards right away.
- **Continuous auto-compounding:** our bot automatically sells your rewards(CAKE, etc.) every 30 minutes, converts them into the LP tokens for the pool you are farming, and compounds them onto your farming principal so you can maximize your APY.
- **Claim ALPACA rewards anytime:** by opening a leveraged yield farming position, you'll earn bonus ALPACA rewards that you can claim anytime on the stake page.

6.1 Example of Leveraged yield farming strategy



- Users can supply any combination of the assets in the LP pairs and choose the desired level of leverage.
- The deposit vault loans users the requested amount (as long as it fits inside the risk parameters)
- Our smart contract then optimally converts your deposited assets and the borrowed BUSD to get an equal value-split to supply the farming liquidity pool. So for example, for the CAKE-BUSD pool, you can deposit any amount of CAKE and/or BUSD to start farming without having to do the conversions yourself.
- We then stake your LP tokens on your behalf to receive CAKE rewards
- CAKE rewards are automatically reinvested into the pool every 30 minutes, maximizing the compounding effect.
- Users can claim ALPACA rewards anytime. The amount of ALPACA rewards is based on the debt size.

7 Risks

Although we take a multitude of safety precautions and Alpaca is [audited](#), farming and participating in DeFi comes with certain risks. Below, we discuss the potential risks associated with using Alpaca Finance.

7.1 Risks to Lenders

7.1.1 Loss of Capital:

- **Risk:** the risk of debt accrued by underwater positions in case liquidators do not liquidate in time during a period of high market volatility.

- **Mitigation:** we have taken a cautious approach in setting key parameters to ensure a large buffer. We also have provided enough incentive to liquidators to call and liquidate applicable positions. Hence, we believe this risk scenario is very unlikely to occur.

7.1.2 Timing of Asset Return:

- **Risk:** delay in getting deposited asset back in case of the pool's high level of utilization. Please note that farmers can borrow the funds as long as they like and there is no fixed term for when the funds must be returned.
- **Mitigation:** we use a triple-slope interest rate to optimize for 90% fund utilization. The steep increase in interest rate beyond the 90% utilization (lending fees scaling from 10-100%) should incentivize more lenders to deposit funds and borrowers to return outstanding loans, optimizing the pool to stay at a flexible level below ~90%.

7.2 Risks to Yield Farmers

7.2.1 Price impact when entering / exiting a position:

- **Risk:**
 - If you try to open a large position relative to the pool size and require swapping, your transaction could incur a large price impact.
 - As an example, if a liquidity of a pool is USD 100 million, swapping USD 1 million (1% of pool's liquidity) worth of tokens would incur **~4% price impact**.
 - If you are unfamiliar with how price impact works for AMM, please [read here on how \$xy = k\$ AMMs work](#).
- **Mitigation:**
 - Open multiple smaller positions or open a smaller position and add collateral to that position at a later time. You should wait for a short interval for arbitrageur to bring price back to normal.
 - Bring a combination of asset that require lower swapping requirement-e.g., if you want to open a 2x leverage on CAKE-BNB pair. Supplying only CAKE token will result in a very small swap amount because the Vault will loan to you approximately equal value in BUSD.
 - Avoid opening and exiting position in a short period of time.
 - When exiting a large position, choose "Minimize Trading" strategy to reduce price impact from swapping asset and trading fees

7.2.2 Impermanent Loss (IL):

- **Risk:**
 - Risk of (impermanent) capital loss from asset rebalancing in the Automated Market Maker ("AMM") pool.
 - Even stablecoin pairs can be subject to impermanent loss if the price of at least one moves off peg. While in general, the IL from this is small and transient, historically, there have been instances where stablecoins have stayed off-peg for extended periods of time. By opening a position with large leverage, you are also amplifying the potential IL on your principal.
- **Mitigation:**
 - Impermanent loss is not unique to Alpaca Finance. It is common among all yield farming and AMMs. While we currently do not yet have a way to mitigate IL, users can choose to yield farm asset pairs that have high correlations to minimize potential IL. For more information on IL, you can start with this [article](#).

7.2.3 Negative APY

- **Risk:**

- o This is a scenario where the borrowing interest rate is higher than your yield farming gain. This means your debt position will grow faster than your equity value. If this continues for a period of time, it could reduce your equity value down to the level that triggers liquidation.
- o Likely causes for this scenario to occur are 1.) high borrowing pool utilization, pushing up the borrowing interest rate. 2.) A significant price drop in the rewards token - i.e., CAKE causing the farming yield to drop.
- **Mitigation:**
 - o Monitor your positions closely and have a plan if APY turns negative - i.e., close position, wait and see, or add collateral to the position.
 - o If utilization remains high for a period longer than a few days, the team will analyze the situation and likely raise the borrowing interest rate which should lower utilization.
 - o Exercise cautions when opening a position if the pool's utilization is high.

7.2.4 Liquidation

- **Risk:**
 - o If you open a leveraged yield farming position, Alpaca Finance borrows a base asset for you to farm. You run the risk of being liquidated if price of the borrowed asset appreciates against the farming token pair. Your position will be liquidated when the Debt Ratio (debt / position value) reaches the Liquidation Debt Ratio aka Kill Threshold. See [Pool-Specific Parameters](#) for more information.
- **Mitigation:**
 - o This can be mitigated by using a lower leverage level, monitoring positions during volatile market conditions, and closing them before hitting the liquidation parameters.

7.3 Smart Contract Risks

- **Risk:**
 - o While our smart contracts have been audited by third-party firms, they could theoretically have vulnerabilities.
- **Mitigation:**
 - o Having smart contracts audited by multiple professional third-party firms decreases the chance of vulnerabilities.
 - o You can find the audit report from PeckShield [here](#).
 - o We also run a bug bounty program to provide incentives for people to look for vulnerabilities in our live code as an extra layer to filter out any potential issues. More on that [here](#).

While we do our best to eliminate all the possible risks, DeFi is an industry where events that no one predicted can occur (the dreaded black swans). So please don't invest your life savings, or risk assets you can't afford to lose. Try to be as careful with your funds as we are with our code.

8 Liquidation

In the event that your debt ratio has gone above the threshold (Liquidation Threshold), your position will be liquidated.

The value you receive back after liquidation will depend on the Liquidation Threshold and net of liquidation bounty taken by the liquidator (5% of position value.)

Example:

Alice opened a 2x leveraged yield farming position on CAKE-BNB pool

- She supplied 10 BNB
- our Vault loaned her 10 BNB
- We then optimally swapped BNB into CAKE and acquired LP tokens for her

At this time, Alice's position is **~20 BNB** (in reality, it will be slightly lower due to price impact from swapping and trading fees)

- Her debt ratio is **~50%**

Sometime later, BNB price has appreciated significantly causing Alice's position to be worth less in BNB term. This is because the LP pool will try to maintain equal value of the token pairs, causing Alice to have more CAKE and less BNB in her position.

Unfortunately, BNB price continued to appreciate such that the debt ratio has reached 80% (Kill Threshold), and the liquidation bot called the smart contract to close her position

- At this time, her position value is roughly **~12.5 BNB**
- **10 BNB** will be used to repay the loan
- **0.625 BNB** (5% of the position value at liquidation ~12.5 BNB) will be paid to the liquidator as a bounty
- **1.875 BNB** will be returned to the user

To make this example easy to understand, please note that this example ignores the impact of yield farming rewards and trading fees which would increase Alice's position value and make her position safer. It also ignores the borrowing interest rate which would increase the debt value, moving her debt ratio higher.

9 Global Parameters

Parameter	Value	Description
Reserve pool take rate	10%	Percent of the borrowing interest that is put into the reserve pool. Half is for buyback and burn of ALPACA
Liquidation bonus	5%	A portion of the position value that goes to the person that calls liquidate function on underwater positions
Reinvestment bounty	3%	A portion of the reward bonus that is taken by our in-house bot that calls the reinvest function

9.1 Minimum Debt Size

The minimum amount of asset that a user can borrow to open a leveraged position.

The minimum amount of asset that a user can borrow to open a leveraged position.

Deposit Pool	Value
ALPACA	50
BNB	0.2
BUSD	100
ETH	0.04
USDT	100
BTCB	0.002

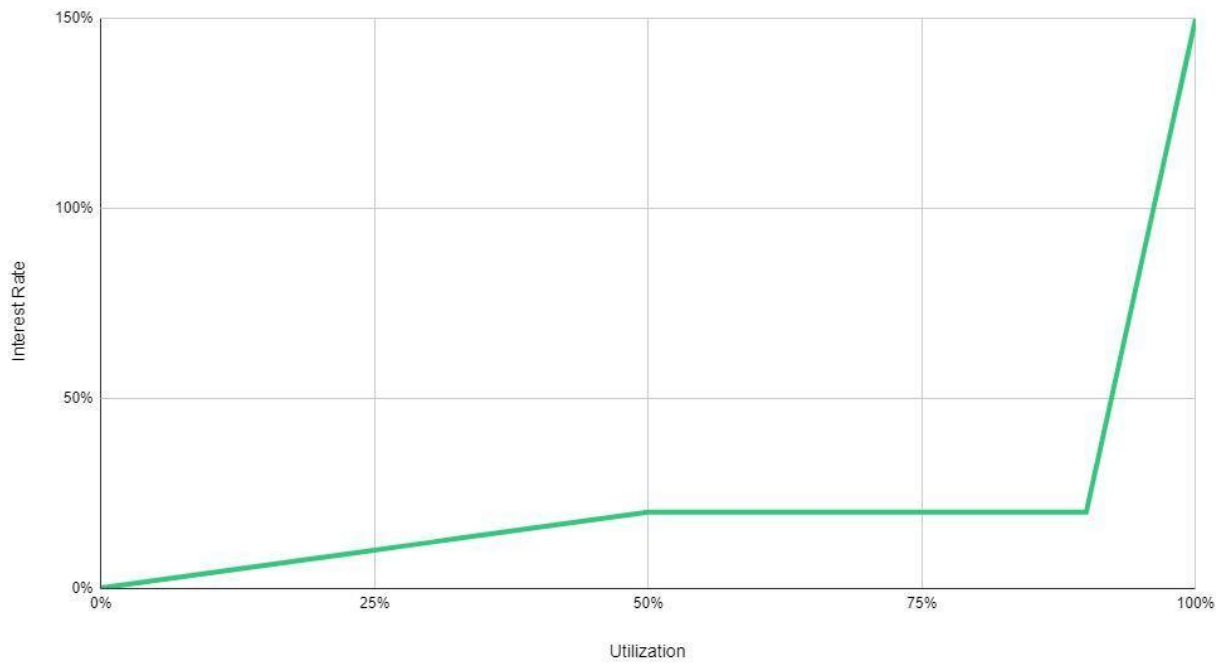
9.2 Interest rate model

We employ a triple-slope interest rate model to determine the borrowing interest rate with detail below:

Utilization Range	Interest rate at min. range	Interest rate at max. range	m	b
0% - 50%	0%	20%	0.4	0
50% - 90%	20%	20%	0	0.2
90% - 100%	20%	150%	13	-11.5

$$\text{Interest} = m * \text{utilization} + b$$

Borrowing interest rate vs. utilization



10 Protocol Configurations

10.1 Design Ethos

We have designed many parameters in Alpaca Finance to be configurable. While the initial configurations are set by the core developer team, we have every intention to let the Governance community decide on what needs to be changed which will happen through voting.

10.2 Timelock

Timelock is a contract for delaying changes to the protocol. This contract is an owner of all the major contracts in Alpaca Finance. Hence, every change needs to execute through this contract, which makes it function as a **security moat**.

In essence, every order from the admin(the group of core developers) has to pass through this contract and is delayed for **24 hours** before taking effect. To be specific, the execution command for the order goes to the queue, waiting to be executed when the 24h delay is passed. This is a security feature that enables the community to see any upcoming updates and prepare in advance for them. If anything looks suspicious, they can pull their funds from the protocol before the update takes effect.

Below are the contracts owned by Timelock

- All Vault Contracts
- FairLaunch Contract
- All Worker Contracts
- All PriceOracle Contracts
- All WorkerConfig Contracts

10.3 Adjustable Parameters

This section lists all adjustable parameters and functions in Alpaca Finance

10.3.1 FairLaunch Contract

- addPool(_allocatedPoint, _stakeToken, _withUpdate)
 - _allocatedPoint = How many points assign to this pool. This will affect the ALPACAs distribution per block.
 - _stakeToken = The address of a required staking token.
 - _withUpdate = A flag for updatePool calculation
- setPool(_pid, _allocatedPoint, _withUpdate)
 - _pid = Pool ID that you wish to adjust the point
 - _allocatedPoint = New points to be assign to this pool. This will affect the ALPACAs distribution per block.
 - _withUpdate = A flag for updatePool calculation
- setBonus(_bonusMultiplier, _bonusEndBlock, _bonusLockUpBps)
 - _bonusMultiplier = Multiplier that will be applied during the bonus period
 - _bonusEndBlock = The block number that bonus will be ended
 - _bonusLockUpBps = % of bonus that is earned in the bonus period to be locked

10.3.2 Vault Contract

- updateConfig(_newConfig)
 - _newConfig = A new contract that is implemented IVaultConfig interface
- setFairLaunchPoolId(_pid)
 - _pid = Pool ID on Fair Contract that the staking token is debtToken owned by Vault
- withdrawReserve(_to, _amount)

- o `_to` = The address to receive amount
- o `_amount` = The amount to be withdrawn from the reserve
- `reduceReserve(_amount)`
 - o `_amount` = Reduce reserve portion for treasury management

10.3.3 PancakeswapWorker Contract

- `setReinvestBountyBps(_newBountyBps)`
 - o `_newBountyBps` = A new bounty that the bounty hunter will get when they trigger reinvest
- `setStrategyOk(_strategyAddresses, _ok)`
 - o `_strategyAddresses` = Addresses for the strategy contract
 - o `_ok` = Can be either true or false. If the `_strategyAddresses` above need to be disabled then set `_ok` = false
- `setCriticalStrategies(_addStrategy, _liquidateStrategy)`
 - o `_addStrategy` = Set default addStrategy
 - o `_liquidateStrategy` = Set default liquidateStrategy

10.3.4 SimplePriceOracle Contract

- `setFeeder(_address)`
 - o `_address` = The address of a new feeder

10.3.5 SimpleVaultConfig

- `setParams(_minDebtSize, _interestRate, _reservePoolBps, _killBps, _wrappedNative, _fairLaunch)`
 - o `_minDebtSize` = The minimum required for borrower to loan from the pool
 - o `_interestRate` = Interest rate per second
 - o `_reservePoolBps` = % to be put in reserve pool in BPS
 - o `_killBps` = % that bounty hunters will get when they liquidate the position
 - o `_wrappedNative` = Address of the wNative token
 - o `_fairLaunch` = Address of the fair launch contract
- `setWorker(_workerAddress, _isWorker, _acceptDebt, _workFactor, _killFactor)`
 - o `_workerAddress` = The address of the worker
 - o `_isWorker` = The flag to set if this is worker
 - o `_acceptDebt` = The flag to set if this worker is accepting the debt
 - o `_workFactor` = The flag threshold to prevent user from over leverage
 - o `_killFactor` = The flag threshold to mark if position can be liquidated, aka kill threshold

10.3.6 ConfigurableInterestVaultConfig

- `setParams(_minDebtSize, _reservePoolBps, _killBps, _interestModelAddress, _wrappedNative, _fairLaunch)`
 - o `_minDebtSize` = The minimum required for borrower to loan from the pool
 - o `_reservePoolBps` = % to be put in reserve pool in BPS
 - o `_killBps` = % that bounty hunters will get when they liquidate the position
 - o `_interestModelAddress` = Address of the interest model
 - o `_wrappedNative` = Address of the wNative token
 - o `_fairLaunch` = Address of the fair launch contract

10.3.7 PancakeswapWorkerConfig

- `setOracle(_newOracleAddress)`
 - o `_newOracleAddress` = The new oracle address
- `setConfigs([]_WorkerAddress, []_configs)`
 - o `[]_WorkerAddress` = address of worker
 - o `[]_configs` = Config object including:
 - `_acceptDebt`
 - `_workFactor` = The flag threshold to prevent user from over leverage
 - `_killFactor` = The flag threshold to mark if position can be liquidated, aka kill threshold
 - `_maxPriceDiff`