Dynamic Risk-Adjusted Tranches for LPs in a Margin Based Perpetual Protocol

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Abstract

Margin based perpetual protocols where LPs act as counterparties are a relatively novel innovation in DeFi. They now compete as a strong alternative to the more traditional perpetual protocols that are built on order books. While the new paradigm has seen success, they still fundamentally face existential threat from tail events that could result in unexpected losses for the counterparties. Since this risk cannot be eliminated, we propose a solution that focuses on transforming risk appropriately to each counterparties' unique preferences, using dynamic risk tranches. By allowing LPs to choose their own risk profile, Avantis Finance aims to maximize the diversity of the LPs, and therefore, the sustainability of the protocol (especially during tail events).

An Introduction to Oracle-Based Perpetuals

Oracle-based perps make the use of oracles for setting the opening, closing and liquidation price. This is in stark contrast to order book based perps (or virtual AMM based perps) where price discovery indicates the mark price, and is compared with the index price (the price from an oracle) to set a funding rate and effectively reduce the delta between the mark and index price. Put plainly, oracle based perps do not engage in price discovery, and are *price takers*. This is an advantage, not a drawback, as regardless of the liquidity present in the system, oracle based perps allow for 0% slippage trades, given there is no cost associated with price discovery. On the one hand, one can argue that the lack of price discovery implies that any oracle-based perp platform cannot grow to the levels of a regular exchange like Binance or Uniswap. However, optimists argue that as long as there exists a healthy spot exchange market in DeFi and CeFi, you do not need to rely on price discovery and the slippage that comes along with it, when you can simply have an oracle based perp platform. There is enough precedence for this that we are excited to build Avantis, an oracle-based perps platform that fundamentally solves for the biggest drawback of this architecture: counterparty risk for LPs.

An Introduction to Avantis

Avantis is a decentralized leverage trading platform for cryptocurrencies and forex. In addition to the efficiency that oracles provide for pricing, we want to bring several improvements across the LP and trader stack that existing protocols currently lack. One big area of innovation here is introducing dynamic risk management for liquidity providers via tranches, which allows them to select their appropriate risk-reward level. This optionality helps liquidity providers that prefer a different risk profile to stay allocated in the pool instead of looking elsewhere. We plan to offer a junior and senior tranche, which provides returns and shares risk in a specific ratio given the balance of those pools (more on this later). This allows for fine-grained control to LPs over their risk and return profile, allowing for a diverse LP pool, deep liquidity for traders and an organic flywheel for high LP returns. Figure (a) explains the core architecture for Avantis, with the USDC vault at the center of all trading activity, liquidity provisioning, token staking and composable protocols.

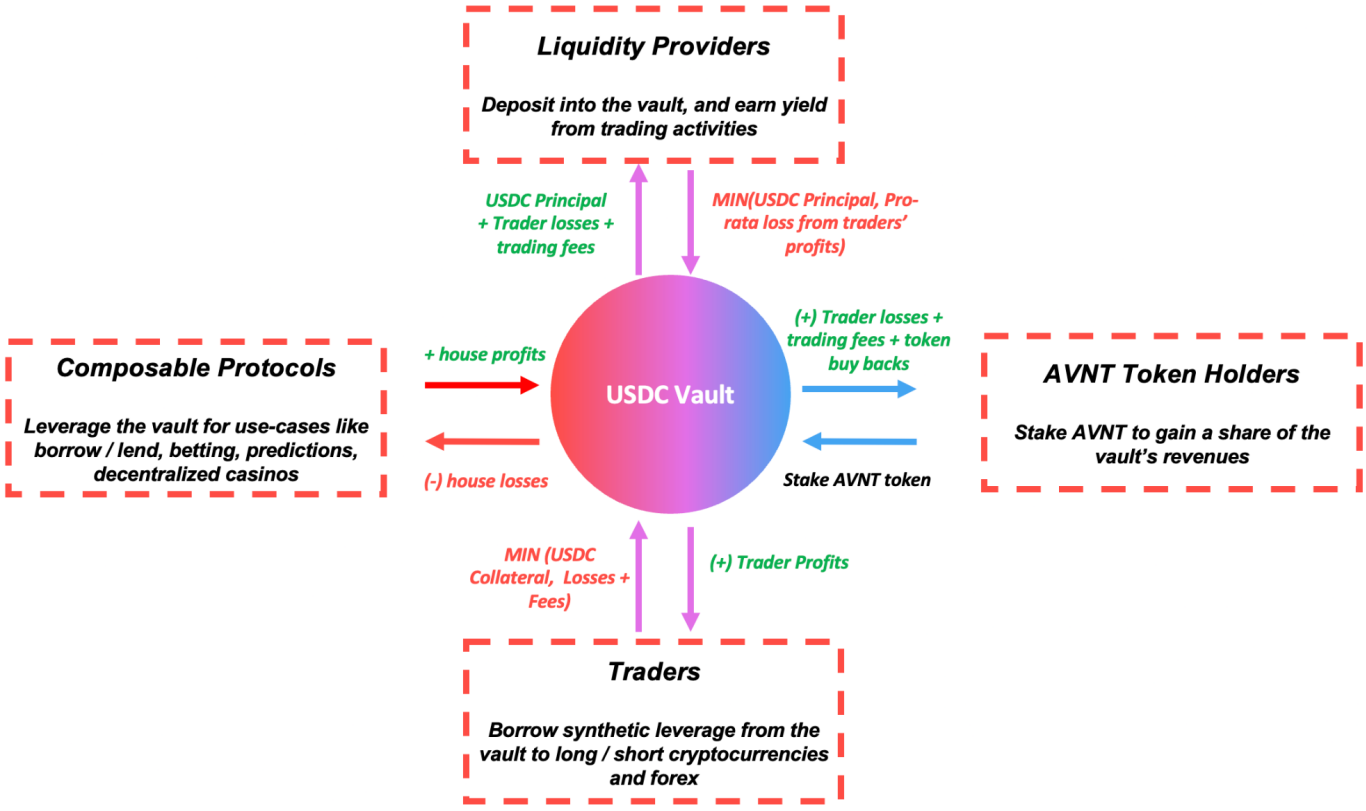

Figure (a): Avantis - High Level Architecture

Abstracting away the token holders and any composable protocols building on top the USDC vault, the key thing to note here is that this USDC vault is further divided into the junior and senior tranche, shown in figure (b) below

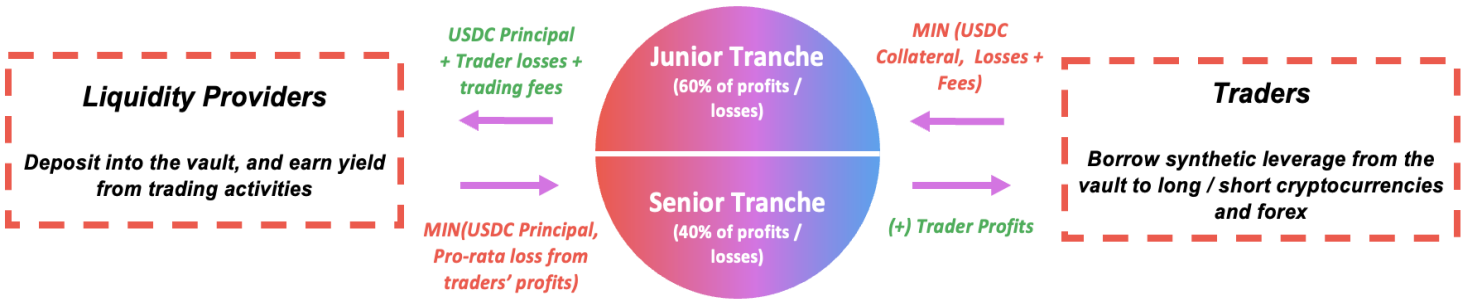

Figure (b): Avantis - Dynamic Risk Tranches

Dynamic Risk Tranches for Liquidity Providers

In traditional finance, tranches represent pieces of a pooled collection of securities, usually debt instruments, that are split up by risk or other characteristics in order to be marketable to different investors. Tranches carry different maturities, yields, and degrees of risk—and liquidation preferences for repayment in case of default. Unlike traditional tranches however, smart contracts allow us to modify the tranche properties in real-time based on current liquidity data. While LPs in an oracle-based perp protocol are not creditors in the traditional sense, they are indeed lending out leverage to traders. Hence, LPs face the very real possibility of counterparty risk similar to other debt instruments. Although oracle-based perp protocols are empirically very successful, there are times where LPs can incur losses when large traders on the platform suddenly earn large sums of money (net of fees and other traders' losses). In existing protocols, losses are evenly spread across the LPs, assuming every participant has the same expectation for risk and return. This assumption is quite wrong, which brings us to the concept of 'Dynamic Risk Tranching'. Here is how it works:

1. Normally, leverage is reserved in a 60-40 ratio from the senior and junior pools, assuming there is enough liquidity in both tranches to execute a trade. We define "normal liquidity conditions" in the following manner
    a. Each tranche has a minimum liquidity reserve ratio of 2x, which means each tranche should have at least twice the liquidity being requested from it. For e.g if a trader requests $1,000 for a trade, we need to reserve $600 from the junior tranche and $400

from the senior tranche. Hence, the junior and senior tranche need to have >=$1,200 and >=$800 respectively

b. The delta between the junior and senior tranche balance (tranche liquidity as a proportion of total liquidity) does not exceed 35%. This is to check for skew / extreme imbalance

c. The below example of Bob the Trader is illustrative, and shows what happens under normal liquidity scenarios

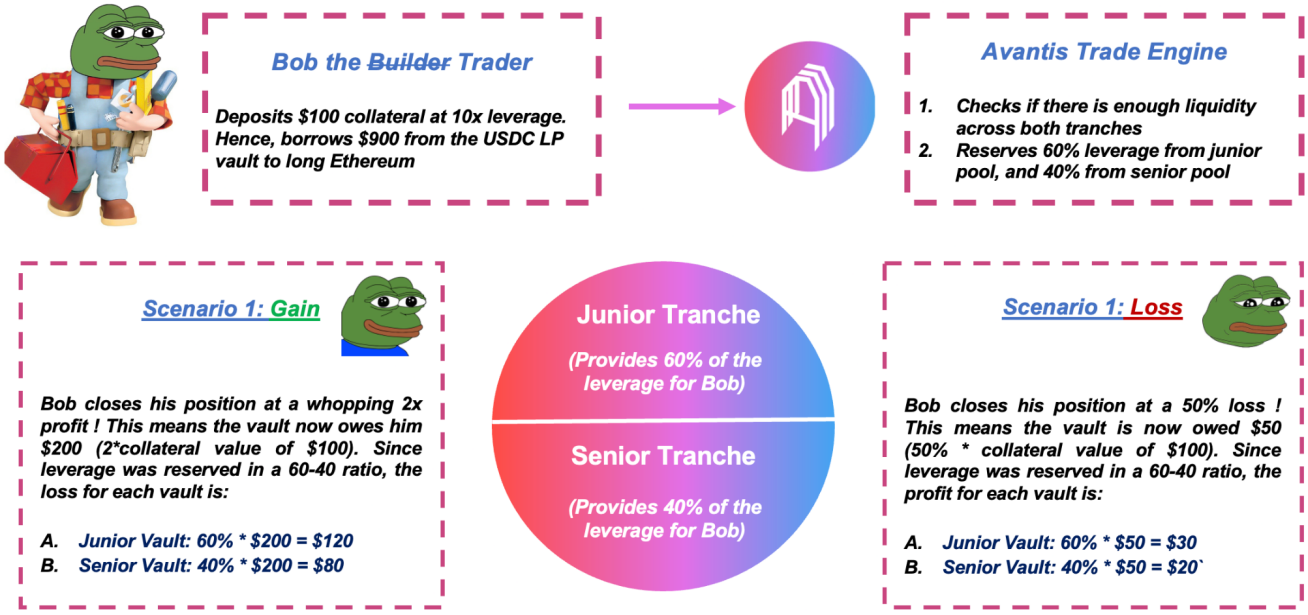

Figure (c): Avantis - Dynamic Risk Tranches in Action [Under Normal Liquidity Conditions]

2. When even one of these conditions is violated (i.e a skew in pool balances or not enough liquidity across both pools), we reserve leverage in the ratio of the actual pool balances, but distribute profits in a dynamically changing ratio to incentivize LPs to rebalance pools back to a range within our target pool balance delta.

Tackling Liquidity Imbalance in Tranches: Introducing Dynamic Yield Multipliers

For the most part, we expect incentives from the delta in yields across the two tranches to drive pool liquidity and ratios within our target bounds (<=35% delta in pool ratios). At its core, Avantis is a protocol for perp traders, and regardless of the liquidity balances of either tranche, we always want to prioritize trade execution. Hence, under any scenario outside the “normal” liquidity conditions, there

needs to be an exponential increase (or decrease) to the profits of the junior tranche, so that we can push pool balances back to our target. Incentivizing higher gains than the 60-40 paradigm, or reducing gains to be equal to the senior pool (50-50) should drive pool ratios back within our target delta, while protecting LPs during a loss (and keeping all LPs mostly satisfied, versus equally upset in the case of competing oracle based perp protocols). Under every scenario, the junior tranche will still absorb the loss in a 60-40 ratio (or the maximum loss it can absorb given pool liquidity, whichever is lower).

Due to the nature of permissionless contracts, it is imperative that the tranching system be robust against bad actors that attempt to game the system. A naive approach that incentivizes the junior tranche with higher potential losses (instead of lower potential gains) is unfortunately very vulnerable, as during a state of loss we want to prevent bad actors front-running the protocol and shifting their liquidity from the junior to the senior pool. This is why we apply a dynamic multiplier to junior pools gains as the pool ratios (and total system liquidity) changes, which works in the following way:

A. The protocol checks if the vault liquidity is in a "normal state"
B. If this condition is violated, the protocol enters a constrained state of liquidity. Leverage is reserved in the ratio of the pool balances (calculated as of the trade request), but for calculating any yield applicable to the junior tranche, a yield multiplier is applied to the junior tranche proportion
    a. As you can imagine, when the proportion of the junior tranche is disproportionately lower than the senior tranche, we would apply a exponentially higher multiplier to incentivize LPs to shift to the junior tranche
    b. However when the proportion of the junior tranche is disproportionately higher than the senior tranche, we start lowering the gains multiplier to 1x (same APR as senior tranche but a higher potential loss for investing in the junior tranche) to incentivize LPs to shift to the senior tranche

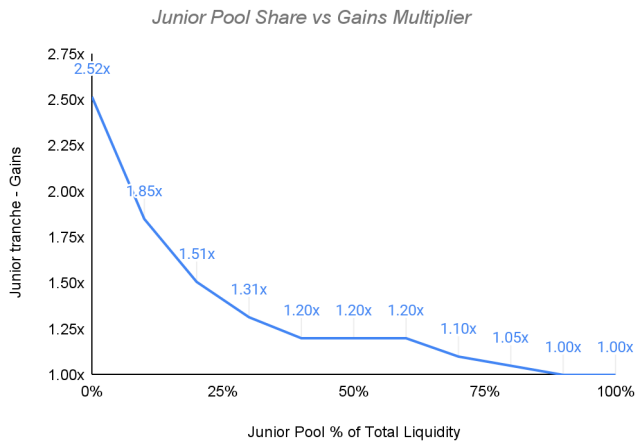

Figure (d): Avantis - Dynamic Gain Multipliers [Under Constrained Liquidity Conditions]

We can also look at the illustrative pool returns under the following scenario where we have $1,000 of total liquidity across both pools (with the total amount split 0% all the way to 100% for the junior pool), and a $100 (10%) change in the LP value in either direction (i.e a $100 trader profit or loss)

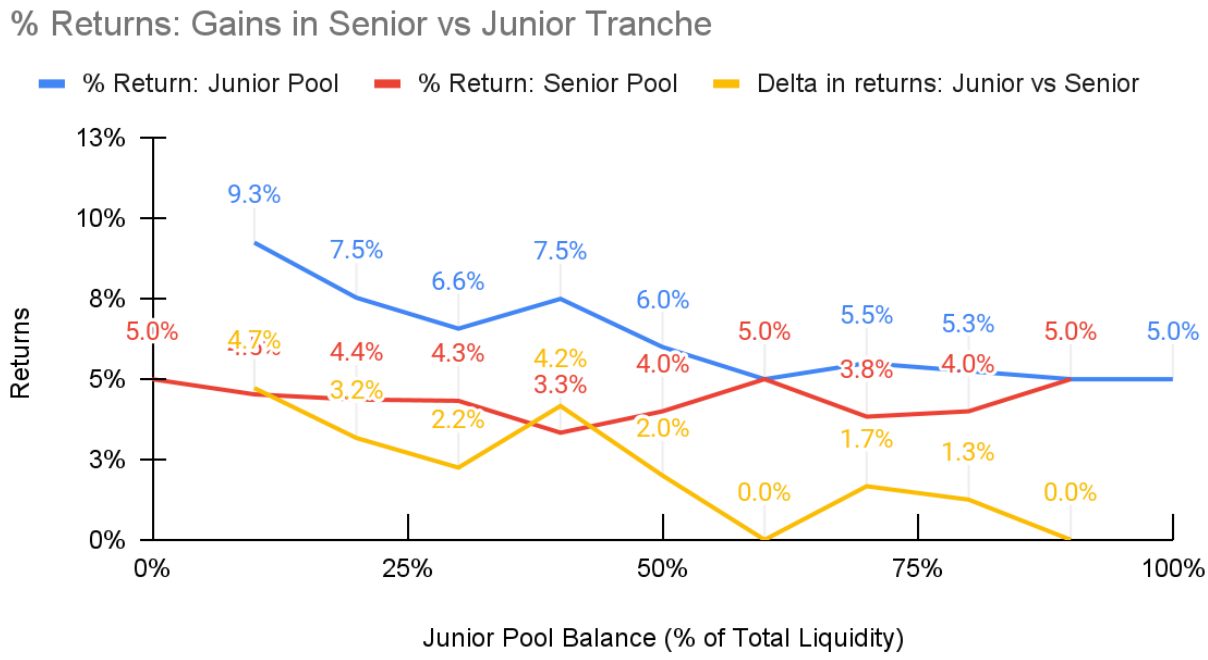

Figure (d): Avantis - Relative Returns for Tranches (Profits)

We can see that junior pool LPs make much higher returns when liquidity is skewed in favor of the senior pool. During these times, we can nudge LPs on the skewed side to internally shift over to the junior pool (or away from it) using a dynamic return profile (to be clear: LPs don't have to withdraw from the pool, just one-click shift to the other pool). Hence, there is an additional benefit of this game theory in making the LP experience more active and engaging, however, the most important benefit is applying gain / loss parameters differently to LPs with different risk preferences.

Likewise, figure (e) shows that in a state of loss, not only do junior LPs always lose more than senior LPs on an absolute basis, but the delta in losses increases as the pool ratios begin to diverge significantly and the junior pool becomes an outsized portion of the overall liquidity.

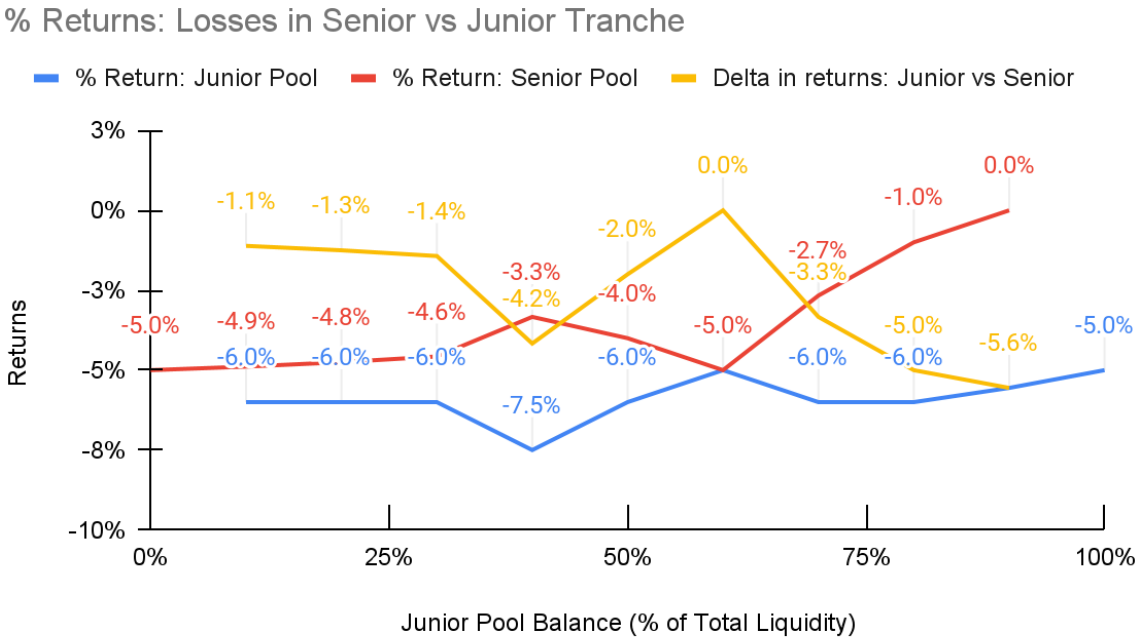

Figure (e): Avantis - Relative Returns for Tranches (Losses)

Conclusion

Oracle-based perps are here to stay given their core value proposition of 0% slippage trades and net positive value accrual for LPs and token holders. However, their scalability will always be contingent on being able to protect LPs during a downturn, and the best way to do so is by allowing LPs to opt-into different risk buckets, allowing for an effectively higher risk-adjusted yield (sharpe ratio) for each LP.