vSPACEX V1 Whitepaper by ItoVault

Abstract

vSPACEX is a pre-IPO token based on ItoVault 1.0. It intends to replicate the holding period return from owning a share of SpaceX from now until after the company IPOs.

vSPACEX uses TWAP market prices from Uniswap as the primary price oracle to determine margins and liquidations. As such, the price feed is effectively 24/7, continuous to the resolution of hours, and based on actually tradable prices. To resist short squeezes, a liquidation challenge mechanism is available to vault owners when TWAP prices are substantially higher than underlying share transaction prices in private markets. vSPACEX aims to adjust for as many corporate events as feasible.

Dependency on Original Whitepaper

This sub-whitepaper is intended to be read in conjunction with the ItoVault 1.0 whitepaper, which also specifies ItoVault's prototypical implementation: vSPY[1]. For conciseness, this sub-whitepaper only highlights major differences. This sub-whitepaper may omit topics that are

[1] vSPY has been successfully operating since November 2020, replicating the value of the S&P 500.

already included in the whitepaper, even if they are important. This sub-whitepaper will use terms from the whitepaper without further definition. Finally, this sub-whitepaper doesn't intend to fully cover all aspects of the vSPACEX system. Similar to some defi projects, the Discord channel will also implicitly be a source of documentation. On Discord, the ItoVault foundation will take questions and give thorough answers.

About vSPACEX on ItoVault

V1.0 of vSPACEX ItoVault has been released effective March 3rd, 2021 under address on mainnet of 0x31CE064C35E03F0BC9d746835E25A98d944a24D3 . The vSPACEX token is available at 0x44e28f2aCC84C36373BAdcd681749D38E01e2cC4 .

vSPACEX Specification

The major innovations and differences between vSPACEX and the base ItoVault 1.0 / vSPY are: 1) the price feed sources, which interacts with the 2) liquidation process. Finally, since vSPACEX may be subject to more corporate actions, 3) the set of corporate action adjustments is larger than vSPY, which is only subject to dividend.

Price Feed

Unlike the SPY ETF, which has a large source of liquidity and prices during market hours, SPACEX is a private company. SpaceX does not have minutely fine-grained price data from traditional financial markets. Fortunately, the problem has a known solution, and in many aspects vSPACEX is more robust than vSPY.

While vSPY receives its price data from a Chainlink oracle (or whitelisted oracle) that ingests data from traditional finance markets, vSPACEX receives data from two sources.

Primary Feed: Uniswap TWAP

The primary data source is the Uniswap TWAP price over the last 2 hours[2]. The TWAP avoids flash-loan manipulation issues; we will call this just the "TWAP Price".

The TWAP Price has many advantages over the vSPY price feed. First, the TWAP price is on-chain, and requires no oracle. Even the most sophisticated of oracles have trust and reliability issues, both theoretical and historically realized. Second, the vSPY price feed has relatively larger jumps. Some are an artefact of the ItoVault design, like our oracle not updating

[2] We choose 2 hour as follows. If we were to update with lag substantially longer (e.g. 10 hours), this may allow for substantial price jumps on a volatile day (despite the underlying price process being a diffusion), and this may allow for prices to be stale for too long. If we were to update with a lag substanitally shorter (e.g. 6 minutes), this allows oracle attacks to be too cheap as an attacker only needs to manipulate the price for a short time, not allowing news to spread and arbitrageurs to profit from the manipulation.

every hour. Other jumps are fundamental to the SPY, like the markets closing on weekends. These jumps substantially increase margin requirements, as the minimum margin must be no less than the maximum jump. Using Uniswap ensures price feeds exist approximately hourly, 24/7, and reduces margin requirements while increasing vault safety (and so improves capital efficiency) over competing designs.

An inevitable issue with using the price of an asset itself as the sole basis for margin requirements is the short squeezes and market manipulation. This is an open problem even in traditional stock and futures markets. If a malicious actor buys large amounts of vSPACEX for the sole purpose of increasing the margin requirement, she could bankrupt a large number of vSPACEX vaults, and then liquidate those vaults for a profit. This brings us to a secondary price data source.

Secondary Source: Actual Transactions of Shares

A secondary data source is actual transactions on private markets. This secondary data source is used to mitigate short squeezes by allowing the vault owner to challenge a liquidation in a process outlined below. It is provided by a whitelisted oracle in V1.0 and in the future can be provided either by governance vote or a more decentralized oracle like Chainlink.[3]

Secondary Price Feed Source

The Secondary Price Feed depends on private transaction data. The specifications for Secondary Price Feed updates by the whitelisted oracle are as follows.

Timing of Update

The secondary oracle will be updated at least once a week if there is a new set of Qualified (see below) transactions that cumulatively comprise more than 1% of market cap since the last price update. The update would set the price at the VWAP of the minimal set of most recent transactions that is >=1% of market cap.[4]

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[3] The extra cost of using a whitelisted oracle seems to be lower for this usage case in vSPACEX versus vSPY. SpaceX requires many more event data feeds (corporate actions, interpreting M&A, dating an IPO, etc) that SPACE. The reward vs risk tradeoff then favors an accurate oracle over a fully decentralized one. However, a fully decentralized oracle is top on the priority list and will be implemented as soon as usage justifies.

[4] By way of example, suppose the secondary price feed last reported a 5% transaction that occurred on Monday June 1st, 2020 with a share price of $100. This transaction was reported to the mainnet blockchain by the oracle on Tuesday June 2nd, 2020. Then suppose there are no transactions for all of June. The secondary oracle is not updated for the rest of June. Then on 7/1/2020, 0.5% of shares (market cap) transact at $110. The secondary oracle is not updated. Then on 8/1/2020, 1.1% of shares transact at $120. The oracle is then be updated the next week with a price of $120 and a transaction time (both start and end) of 8/1/2020.

Qualified Transactions

Qualified transactions are all transactions that are At Arms Lengths and Reputably Reported.

At Arms length includes: sales of shares on private marketplaces where both parties are not closely related (closely related transactions would include within family, to employees, trust to beneficiary, etc); fundraising of the company in priced rounds from chiefly investors (versus executives, or Elon Musk); other buybacks and issuances by the company in transactions where price is negotiated. Generally, transaction will be presumed to be at length unless clearly specified otherwise.

Reputably Reported are transactions that either occur on a reputable private marketplace like EquityZen or ForgeGlobal and are reported by that marketplace, or are reported by 2 reputable news sources (like WSJ, New York Times, ABC, NBC, CBS) including Crunchbase and SEC Edgar.

Liquidation preferences are ignored unless it is patently clear that the liquidation preferences comprise a majority of the transaction's value. The scope of Qualified transactions would be for common shares of SpaceX stock, or another instrument similar to common shares modulo a liquidation preference of minority value.

Note that the functioning of vSPACEX does not depend on the high accuracy or low latency of the Secondary Price Feed. vSPACEX is backed by its conversion to SPACEX shares after the company IPOs, not any price feed. vSPACEX's capital requirements is majorly and frequently controlled by the Uniswap TWAP oracle. A well-functioning secondary price feed's main purpose is to prevent egregious (>3x fair market value) short squeezes, and to provide baseline margin requirements.

After SpaceX IPOs, the secondary price feed will be updated weekly with the officially reported exchanges prices of the primary stock exchange SpaceX lists on.

Liquidation Process

The basic liquidation process for vSPACEX is similar to vSPY. In particular, there are two margin limits:

Suppose in a second scenario, all of the above is the same except instead of 1.1% of shares transacting on 8/1/2020, only 0.8% did. Then the week after 8/1/2020, the secondary price oracle would be updated to reflect a price of $112.31 with a transaction start time of 7/1/2020 to start and 8/1/2020 to end.

Initial Margin:

The initial margin requires the ETH deposited in your vault to be worth > 200% of the vSPACEX tokens outstanding (as measured by the max of TWAP price and secondary oracle). The initial margin condition must be met after any action that increases the leverage of your vault: either withdrawing ETH or issuing more vSPACEX. The 200% may be set by governance to a prudent ratio on an ongoing basis.

Maintenance Margin: requires the ETH deposited in your vault to be worth >166.67% of the vSPACEX tokens outstanding (as measured by the max of TWAP and secondary oracle price). If your vault collateral falls under the maintenance margin requirements, then anyone can start a liquidation process.

Liquidation Start: When maintenance margins are not met, anyone may liquidate the vault to claim the TWAP price plus a 5% liquidation incentive. In order to start the liquidation process, a user must submit vSPACEX tokens into the vault to pay off the vault vSPACEX debt. There may be multiple liquidation starts until the vault is fully paid off.

The liquidation start process kicks off a 28 hour period (to give the vault owner more than a full day's notice) where the vault owner may challenge the liquidation claim as a short squeeze. A challenge is off-equilibrium and intended to occur rarely.

Unchallenged Liquidation: An unchallenged liquidation is intended to be the usual equilibrium case. In an unchallenged liquidation, after 28 hours, the liquidator may claim the liquidation ETH. This should happen in the vast majority of cases, so you can see the above as just a 28-hour lock on the ETH being paid out.

Challenged Liquidation: In a challenged liquidation, the vault owner essentially states with high conviction that the TWAP price is a short squeeze, a claim not to be made lightly. The vault owner must stake an amount of ETH equal to the TWAP price at liquidation time in order to sustain the challenge.

In this case, challenge waits until there is a transaction in actual SpaceX shares (e.g. on the private markets) of at least 1% of market cap. The transaction must occur after the liquidation start time. If the actual transaction price is < ⅓ of the TWAP price at liquidation, then the challenging vault owner wins. The liquidator gets nothing and the vault owner keeps the vSPACEX tokens used in the liquidation. The system is essentially saying in this case of the world that TWAP price was too high and the challenge was more likely due to a short squeeze.

If the actual transaction price > 1/3x of the TWAP price, then the liquidator gets the full original liquidation amount PLUS the challenge stake. The system says in this case of the world that the TWAP price was sufficiently close to actual SPACEX share transaction prices that it wasn't a short squeeze.

Challenges are off equilibrium and should not be seen often. The presumption generally is that the TWAP is correct, and the vault holder is not favored in a liquidation. The challenge system above is designed to be costly for vault owners in case a short squeeze is not happening. However, since a short squeeze is a fragile coordination equilibrium, even a mild challenge mechanism like above will ward off attempts at short squeezing.

Global Settlement Upon IPO

After SpaceX IPOs, the current vSPACEX token will settle. At the Settlement Time[5] the market price of SpaceX in terms of the collateral (ETH) will be recorded. The ItoVault global settlement mechanism will be activated for vSPACEX. This guarantees vSPACEX holders will be able to trade their tokens for the Settlement Price amount of ETH, and vault holders will be able to remove their collateral after netting out vSPACEX debt. Please refer to the ItoVault whitepaper for global settlement mechanisms.

Between the IPO and the Settlement Time, the Secondary Price Feed will be the official market price of the SpaceX stock, updated regularly.

Before the Settlement Time, the ItoVault foundation will endeavor to allow vSPACEX owners to opt-in to a new smart contract to convert the vSPACEX tokens into vSPACE_PUBLIC tokens. vSPACE_PUBLIC tokens would indefinitely track the SpaceX publicly traded stock price much like vSPY. This trade mechanism is wholly separate from the vSPACEX smart contract and voluntary.

Adjustments for Corporate Actions

SpaceX may take corporate actions that affect the holding returns of owning a share of SpaceX. vSPACEX intends to mimic these returns, and make simple adjustments when feasible when an action significantly impacts share value.

The options clearing corporation (OCC) provides a set of template instructions for how corporate actions may be handled by derivatives (options). vSPACEX uses the OCC instructions as a guideline for its own adjustments.

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[5] Define the Primary Exchange as the official listing exchange of SpaceX during its IPO. For Settlement, dates and times are defined by the local time of the Primary Exchange. The Settlement Time is the close of regular trading hour market price as reported by the Primary Exchange on the 10th Wednesday after the IPO occurs. If that day is not a full market trading day, then the settlement time is delayed to the next full market day. For example, if the stock IPOs on Wednesday August 5th, 2020, then the settlement time would be Wednesday October 14th, 2020. We chose this delay to allow users ample time to set up infrastructure to own the now publicly traded stock.

The vSPACEX will contain a Corporate Action Multiplier (CAM), a number that represents the multiple of SpaceX shares that each vSPACEX token represents. The CAM starts out at 1 exactly, and is adjusted for corporate action. For example, if a 5% dividend is paid, the CAM is increased to 1.05. Then, if SpaceX IPOs at a valuation of $1000, each vSPACEX token will be worth $1050.

The following is a list of common potential corporate actions and adjustment rules.

Common Actions and their Standard Adjustments

Symbol or company name change: no action is needed.

SpaceX Engages in an Acquisition Where SpaceX is the Acquirer: no action is needed, regardless of whether SpaceX pays via stock or cash.

Split or Reverse Split: The CAM is changed to adjust for the split. For example, in case where there is a reverse split and 1 new share of SpaceX is worth 3 old shares of SpaceX, the CAM would change from 1 to .33333333333.[6]

Stock Dividend (when the dividend is SpaceX stock): treated similar to a split.

Cash Dividend: For a growth company like SpaceX, we anticipate cash dividends to be rare. To adjust for this properly, we divide the dividend by the next private market transaction price of SpaceX stock (for example, if there is a $20 dividend, and SpaceX the next price update of the secondary price oracle is $300, the CAM would go from 1 to 1.066666666667. When the dividend is minimal (both less than 1% in an instance and less than 1% over the past 365 days), we do not account for that dividend.

Less Common / Less Standard Adjustments

Rights Offering (Opportunity to Buy SpaceX Shares): We value the rights offering as follows. Accounting Value = (Price of Last Secondary Price Feed - Price of Offering) * Shares Offered Per Current Share. For example, if the last SpaceX transaction price was $200, and SpaceX allows each share of SpaceX to buy 2 shares of SpaceX at $170, the value of the rights offering would be ($200-$170) * 2 = $60. The Percent Value is calculated as the Accounting Value / Price of Last Secondary Price Feed. In the above example, it would be $60/$200 = 30%. The CAM would be increased from 1 to 1.3.

For rights offerings that are less than 10% Percent Value, we do not account for the rights offering; this includes rights offerings of zero or negative accounting value (where the Price of Offering is at or higher than the Price of Last Secondary Price Feed.

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[6] For decimal conversion purposes, we target >=10 digits of precision whenever possible.

Spin Off (e.g. SpaceX spins off MarsX): If the spinoff is clearly worth less than 10% of the parent company, the spinoff is not accounted for. Otherwise, vSPACEX holders are entitled to receive the pro-rated shares of the new corp as a pre-IPO token.

SpaceX is Acquired for Cash or Publically Traded Stock: Global Settlement 100 days after settlement.

SpaceX is Acquired for Non Publicly Traded Stock: SpaceX Coins to Converts to the Pre-IPO token of the new company.

Bankruptcy: vSPACEX will terminate with zero value (global settlement) after the bankruptcy proceedings end. Unless the bankruptcy judge gives SpaceX common shareholders claims of substantial monetary value (>10% of the vSPACEX first Secondary Oracle Price), in which case that value will be used. The recovery value will be calculated in terms of common shares with no liquidation preference.

Other Events

The above should be a relatively exhaustive list of events weighted by probability of occuring and impact on value. In the case of other miscellaneous corporate events: if the impact on SpaceX private share value is less than 30%, the event will not be accounted for. Otherwise, the principle of following the clearly defined monetary value of private SpaceX shares will hold.

In case SpaceX fundamentally changes in a way such that the holding value of SpaceX shares is very nebulous (it is not near zero, yet there is no meaningful at-arms-length transaction for a period of >=5 years that would ground the value of SpaceX shares), ItoVault governance may vote to settle vSPACEX at its discretion of the last known good price, including appealing to Klerios court if needed.

CounterVaults

Due to the risk of a pre-IPO venture stock like SpaceX to have jump risk to bankruptcy, the counter vault feature of ItoVault is not enabled for vSpaceX.[7]

Asset Token Value Index Carry Adjustments

Much like vSPY V1.0, there will be no Carry Adjustments for vSPACE V1.0. However, if we see a moderate volume (>$100K USD) of TWAP prices persistently (>1 month on average) and significantly (>2x value) exceed the private transaction price, we will endeavour to introduce a new vSPACEX V2.0 that does implement these.

[7] Equivalently, their margin requirement is 100%.