Risk Assessment - **sFRAX** Collateral Asset on FiRM

Useful Links

Documentation and Contract Addresses

- sFRAX Contract Address: Etherscan
- Frax Finance Documentation: Frax Docs
- Curve AMO Contract: Etherscan
- Fraxlend AMO Contract: Etherscan
- Fraxswap TWAMM AMO Contract: Etherscan
- FXB Factory Contract: Etherscan

GitHub Repositories

- Frax Finance GitHub: GitHub Repository

Community and Social Media

- Discord: Frax Finance Discord
- Telegram: Frax Finance Telegram
- Twitter: Frax Finance Twitter

Governance and Proposals

- **Governance Portal**: Frax Governance

Audits

- **Reports**: Frax Finance Audits

Bug Bounty

- **Program Details**: Frax Bug Bounty

Additional Information

- **Docs**: Frax Finance Overview
- **Dashboard:** Analytics
- **Whitepaper**: Frax Finance v1 Whitepaper

TL;DR

Overview:

- **Protocol**: Assessment of Frax Finance, featuring the innovative sFRAX - a high-yield, open-duration savings option tethered to the FRAX stablecoin, displaying a swift accrual of 30M TVL within 24 hours of launch.
- **Proposal**: Leverage the Personal Collateral Escrow feature in FiRM to enable sFRAX deposits, allowing users to borrow with a high collateral factor while earning FRAX interest (initially at 10% APY).
- **Utility**: sFRAX offers a yield akin to the Interest on Reserve Balances (IORB) rate of the U.S. Federal Reserve, providing a stable, passive income stream to holders while maintaining robust collateralization.

Key Points:

- **Governance**: Frax employs a decentralized model through its Frax Governance (frxGov) module, overseeing protocol proposals, AMO management, protocol parameters, RWA strategies, and FXB management. Decision-making is significantly community-driven, involving on-chain voting and Snapshot temperature checks.
- **Security**: A holistic bug bounty program and multiple audits (including from reputable firms like Trail of Bits and Certik) underscore Frax's commitment to security. The protocol has managed repercussions from a Curve Finance exploit effectively, demonstrating resilience.
- **Regulatory Risks:** The involvement of FinresPBC as a custodian handling real-world assets and traditional financial mechanisms within a decentralized finance (DeFi) framework could attract regulatory attention.
- **Collateral & Liquidity**: The FRAX stablecoin showcases substantial on-chain liquidity, ensuring stability and lower slippage in larger transactions. The protocol benefits from Chainlink oracles, and maintains a focus of >=100% Collateralization Ratio (CR) to stabilize the FRAX USD peg.
- **Competitive Edge**: No competitors have yet integrated sFRAX into their lending markets.

Conclusion & Recommendations:

- **Asset Score**: Frax achieves a notable Total Asset Score (TAS) of 9.39/10, excelling in areas like market capitalization, trading volume, and token utility, though presenting room for improvement in token distribution.
- **Parameter Recommendations**: Mirroring the DAI DSR FiRM market, recommendations include a supply ceiling of 5,000,000 DOLA, an initial fed supply of 2,500,000 DOLA, and a collateral factor of 90%, among others, to manage exposure and risk efficiently.

Background

Frax Finance has pioneered a novel approach to the stablecoin arena with the recent launch of Frax V3.

1. **Full exogenous collateralization of FRAX**: In an effort to always ensure >=100% CR, FRAX v3 leverages various AMO smart contracts and real-world assets (RWAs) through partner entities (notably FinresPBC).
2. **Sovereign USD peg**: Post reaching 100% CR, the peg of FRAX will track USD, utilizing Chainlink oracles & governance approved reference rates for stabilization.
3. **IORB Rate**: The Frax Protocol dynamically adjusts its strategies based on the “Interest on Reserve Balances” rate, oscillating between heavily collateralizing FRAX with low-risk assets like treasury bills and utilizing decentralized assets and loans in FraxLend when IORB rates are low/decreasing.
4. **Removal of multi-signature trust assumptions**: Operates entirely on-chain using the FrxGov module.
5. **Non-redeemability**: While FRAX is non-redeemable, the protocol utilizes AMO contracts, RWAs, and governance actions through frxGov to stabilize the FRAX price to $1.000 using USD oracles as a reference.

sFRAX (Staked FRAX) is an ERC4626 staking vault which circulates a portion of the Frax Protocol yield to stakers weekly, denominated in FRAX stablecoins. Representing pro-rata deposits within the vault, sFRAX can be seamlessly withdrawn anytime. Notably, the APY of sFRAX aims to match the interest on reserve balances (IORB) rate of the U.S. Federal Reserve, AKA the “risk-free rate” of the US Dollar. The commitment of the sFRAX vault is to pursue this rate, although it does not guarantee adherence. The immediate success of sFRAX is evident, amassing an impressive 30M TVL within 24 hours post-launch.

Taking advantage of the Personal Collateral Escrow feature in FiRM, the proposal is to integrate sFRAX to harness the attractive yield through the FRAX Savings Rate. This will enable users to borrow leveraging a high collateral factor while concurrently receiving sFRAX interest, currently at an appealing 8.69% APY.

Protocol Analysis

Org. Structure

- ☐ **Is the Protocol a DAO? How is it governed eg. delegates , snapshot (10)**

Yes, Frax Finance employs a decentralized governance model through its Frax Governance module, referred to as `frxGov`, that controls FRAX,FPI, and frxETH, and Fraxlend by veFXS stakers.

1. **Decision Making and Proposals**: `frxGov` facilitates the proposal, discussion, and voting on various protocol-related matters, ensuring that changes and adaptations to the protocol and its strategies are determined by its community.
2. **AMO Management**: `frxGov` handles the management of Algorithmic Market Operations (AMO) contracts, which allow the protocol to perform various monetary policy operations and interact with various subprotocols, such as FraxLend and FraxSwap.
3. **Protocol Parameters**: `frxGov` is also responsible for setting various protocol parameters, which might include determining interest rates, reward distributions, and stability mechanisms.
4. **RWA Strategies**: The module plays a role in determining and governing strategies related to Real-World Assets (RWAs), including choosing which assets to consider and the partners to work with.
5. **Integration with Subprotocols**: `frxGov` also governs how FRAX v3 interacts with various internal and external subprotocols, ensuring that integrations and collaborations are in line with the overall strategy and risk profile defined by the governance.
6. **FXB Management**: It has the capacity to initiate transactions related to FXB series and their auctions, determining parameters like quantity and price limits during these processes.

On-Chain voting, temperature checks through Snapshot, and a Forum website are accessible from the Dashboard.

- ☐ **Does Protocol publish analytics / transparency via Dune or similar (10)**

Frax Finance operates a very transparent protocol accessible here.

- ☐ **working group structure (5)**

The detailed organizational structure of Frax Finance in terms of specific departments or teams such as treasury, risk, growth, and product teams is not publicly available based on the information gathered. However, there are mentions of a Frax Core Team involved in various governance proposals and the development of the protocol. For example, FIP-285 to introduce Staked FRAX (sFRAX) into the Frax ecosystem was authored by the Frax Core Team.

Frax Finance is known for its community-driven governance model, where proposals can be made and voted on by the community to guide the protocol's development and operation.

- ☐ **are core contributors compensated / Doxed (10)**

Per FIP-230: Frax Finance has an established budgetary allocation for various operational aspects, including compensation for development and operation. A proposal for the annual budget of 9,000,000 FRAX for the year 2023-2024 was outlined to cover five key categories: Development and Operation, Security (Audits and Bug Bounty), Grants, Reserve Emergency Fund, and Legal & Compliance. Specifically, the Development and Operation budget, which could cover salaries for developers and other operational expenses, is proposed to be 3,000,000 FRAX. Additionally, it's noted that the team plans to continue utilizing their current treasury allotment of FXS (Frax Shares) for core development compensation.

The founder of Frax Finance, Sam Kazemian is doxxed and a well known public figure.

- ☐ **Any known controversies in crypto space (e.g. Sifu) (10)**

No known controversies.

- ☐ **do they have a security or risk management team (7)**

Frax Finance does not appear to have a distinct security or risk management team publicly listed or highlighted on their official channels. However, various elements suggest an infrastructure for managing risks and ensuring security within the protocol.

Proposals have been made within the Frax Finance community to develop specific tools aimed at managing risks. For example, FIP-103 and FIP-238 proposal was made to create a Liquidity Risk Profile Dashboard and another to build a set of risk management solutions for Frax Lend. These proposals aim to quantify and monitor Frax's risk exposures, suggesting a community-driven approach to risk management.

Some key risk measures have been identified within the protocol, including the overall Frax Collateralization, the Max % Safe Price drop of FXS, and the Value at Risk (VaR) stress tests. These measures are aimed at understanding and managing the financial risks within the protocol.

Multisig Structure

- ☐ **Is protocol transparent of multisigs and signers, List/links of multisigs, purpose, and setup x of x (10)**

Frax Finance has disclosed its multisig setup in the official docs here. These are crucial for protocol operations and funds management. The multisigs are categorized into six groups: Community, Team, Investors, Treasury, Advisors, and Comptroller, each with a unique Ethereum address:

1. **Community**: `0x63278bF9AcdFC9fA65CFa2940b89A34ADfbCb4A1`
2. **Team**: `0x8D4392F55bC76A046E443eb3bab99887F4366BB0`
3. **Investors**: `0xa95f86fE0409030136D6b82491822B3D70F890b3`
4. **Treasury**: `0x9AA7Db8E488eE3ffCC9CdFD4f2EaECC8ABeDCB48`
5. **Advisors**: `0x874a873e4891fB760EdFDae0D26cA2c00922C404`
6. **Comptroller**: `0xB1748C79709f4Ba2Dd82834B8c82D4a505003f27`.

☐ **Can multisigs interfere with collateral options? EOA minting (7)**

The governance and operational structure of Frax Finance appear to be designed to involve community input and smart contract mechanisms to manage collateralization and minting processes, among others. While the extent to which multisigs can interfere with collateral options or EOA minting isn't explicitly detailed in the available documentation, here's a breakdown of what is known:

Collateralization Process:

- This involves smart contracts known as Frax Pools, which mint FRAX tokens to users when they deposit collateral, and return collateral when users redeem FRAX tokens. Each Frax Pool accepts a different type of collateral, and Frax Pools can be designed to accept various collaterals, although stablecoins are easiest to implement due to their price stability.
- FIP-188 mentioned setting the target collateral ratio (CR) of the Frax protocol to 100% to gradually remove the algorithmic backing of the protocol, indicating a community-driven decision-making process regarding collateralization.

Minting Process:

- In Frax V1, to mint Frax, users needed to deposit the appropriate ratio of collateral and burn FXS (Frax Shares). Conversely, redeeming Frax credits the redeemer with the appropriate ratio of collateral and FXS. Deprecated minting page can be viewed here.

Collateral Ratio Adjustment:

- A function exists within the Frax protocol to refresh the collateral ratio based on the price of FRAX. If the price of FRAX deviates from $1, this function adjusts the collateral ratio by 0.5% to either increase or decrease it, depending on whether the price of FRAX is below or above $1, respectively. Anyone can execute this function to change the ratio, but it can only be called once every hour.

Influence, Reputation, and Partnerships

- ☐ **How long has the protocol been around , have they endured long bear markets (7)**

Per IQ Wiki, Frax Finance officially launched on the Ethereum mainnet on December 20, 2020. The protocol is enduring it's first bear market.

- ☐ **Have they been exploited and how was it handled , was value restored to users (8)**

Recently, Frax Finance has been impacted by the July 31, 2023 Curve Finance exploit. The impact to Frax Finance is summarized in this Medium post.

- ☐ **Current and notable past partnerships , are they a net positive on the DEFI space (10)**

Frax Finance are very well connected and engaged in several partnerships with various entities, both large and small, on several blockchains within the DeFi and broader crypto space. Inverse Finance and Frax Finance have co-incentivized LPs on various AMMs in the past.

Outside of DeFi, FinresPBC serves as the RWA custodian for Frax, similar to how other DeFi platforms like MakerDAO have entities holding traditional assets. It holds US dollar deposits in FDIC Insured IntraFi savings accounts and earns interest on them.

Audits & Bug Bounties

Previous and Ongoing

- ☐ **Previous and Ongoing audits & bounties with links (10)**

Frax Finance has undergone several audits conducted by reputable firms in the crypto security space. These include:

- November 2020: Conducted by Certik (Certik)
- June 2021 and December 2021: Conducted by Trail of Bits (Trail of Bits - June 2021, Trail of Bits - December 2021)
- April 2022: Conducted by Shipyard/Macro
- August 2022: Conducted by Trail of Bits for Fraxswap & FPI (Trail of Bits - August 2022)
- September 2022: Conducted by Code4rena (Code4rena)
- November 2022: Conducted by Trail of Bits for Fraxlend & Fraxferry (Trail of Bits - November 2022)
- January 2023: Conducted by Trail of Bits for Fraxlend & veFPIS
- July 2023: Conducted by Trail of Bits for FrxGov (Trail of Bits - July 2023).

Bug Bounty Programs:

- Frax Finance hosts one of the industry's largest bug bounty programs. The bounty is calculated as the lesser value of 10% of the total possible exploit or $10 million, paid in a 50/50 split of FRAX and FXS tokens, which are immediately liquid, as detailed here.

Contracts in Scope

- [ ] **Is the scope a comprehensive list of contracts including collateral and wrappers**

The Docs doesn't make it immediately clear which contracts are in scope and which, if any, are not.

Reward Payouts

- [ ] **Rewards paid, vulnerabilities found with severity**

This isn't publicly available based on the research conducted.

Collateral Analysis

Oracles

- [ ] **Available Chainlink Oracles**

The Oracles Used to get FRAX-collateral and FXS-collateral price data are listed here.

FRAX on Mainnet can count on two Chainlink price feeds for FRAX-USD, and FRAX-ETH.

The FRAX chainlink feed updates every 1 hour or when there's a 1% price deviation. The Frax Chainlink oracle has a price deviation 4x higher than DAI. 0.25% to 1.0%.

- [ ] **Any advanced oracle or market implementation required**

No advanced oracle required. For market implementation, sFRAX (savings rate) issues a receipt token. As such, the rewards implementation shouldn't differ compared to other reward-generating collaterals with markets on FiRM.

- [ ] **Peg Risk if any**

Several factors contribute to peg risk in the context of Frax Finance, including:

1. **Collateralization Ratio Fluctuations**: The collateralization ratio (CR) in Frax Finance is a crucial determinant of the stablecoin's peg to the USD. Changes in the collateral ratio could affect the value of FRAX. If the collateral backing FRAX falls significantly, it could potentially impact the peg.

2. **Algorithmic Mechanisms**: Frax Finance utilizes algorithmic mechanisms to maintain its peg. Any malfunction, bugs, or unexpected behavior in the algorithm could potentially result in FRAX deviating from its peg.
3. **Market Dynamics**: Market dynamics such as supply and demand, liquidity, and trader perceptions could also influence the peg. A sudden loss of confidence or massive sell-offs could temporarily or permanently affect the peg.
4. **External Economic Factors**: Economic factors such as inflation rates, interest rates, and general economic conditions can indirectly affect the peg, especially if they influence the value or stability of the collateral backing FRAX.
5. **Oracle Risks**: The price feeds from oracles like Chainlink are crucial for maintaining the peg. Any manipulation, inaccuracies, or failures in the oracle system could lead to incorrect data being fed to the Frax protocol, potentially affecting the peg.
6. **Smart Contract Vulnerabilities**: Smart contract bugs or vulnerabilities could be exploited by malicious actors, leading to a loss of funds or other issues that could affect the peg.
7. **Regulatory Risks**: The regulatory risks tied to sFRAX and the Frax Finance ecosystem are largely connected to its association with FinresPBC, which acts as a custodian for Real-World Assets (RWAs) within the protocol. The specifics of regulatory risks or challenges requires a deeper dive into official documents, regulatory filings, or statements from Frax Finance and FinresPBC.
8. **Liquidity Risks**: Insufficient liquidity in the markets where FRAX is traded could lead to price discrepancies, making it harder to maintain the peg.

Frax Finance has instituted various measures, including a combination of algorithmic and collateralized approaches, as well as community governance to manage and mitigate these risks to ensure the stability of FRAX's peg to the USD. Nonetheless, like with any financial instrument, certain risks remain inherent and participants should be aware and consider these risks when interacting with Frax Finance or similar stablecoin platforms.

Token Statistics

- ☐ **Contracts**

FRAX Etherscan

- ☐ **Price / Market Cap / Circulating Supply / Locked Supply / True Circulating / Total / Max**

Coingecko

Price	Market Cap	Circulating Supply
0.999429	671,865,026	671,723,780

Liquidity

- [ ] **Mainnet Dex Liquidity**

LP	Protocol	Liquidity ($)	24 Hour Volume ($)
FRAX-USDC	Curve	121.3M	11.9M
FRAX-USDC	Uniswap	89.4M	2.6M
FRAX-USDP	Curve	64.03M	2.2M
alUSDFRAXBP	Curve	45.2M	58k
FRAX-DAI	Uniswap	18.3M	836k

It's evident from the table above that FRAX has very deep on-chain liquidity.

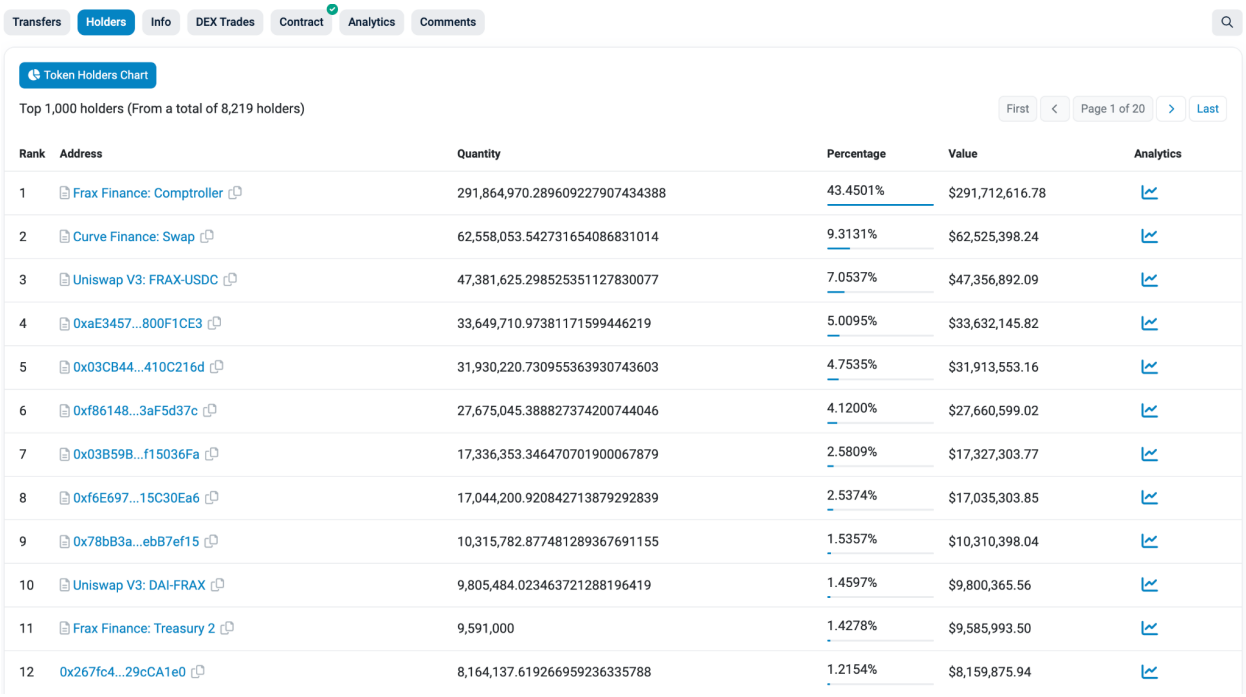
- [ ] On-Chain Slippage

Trade	Frax ->	DOLA	Slippage (%)
$500,000	501248	502129	0.43
$1,000,000	1002580	1004101	0.41
$2,000,000	2005251	2007435	0.37
$4,000,000	4010505	4011742	0.29
$6,000,000	6015759	6012948	0.22
$8,000,000	8021013	8010171	0.13
$10,000,000	10026208	10000925	0.01
$15,000,000	15039312	14845041	-1.03
$20,000,000	20052417	16752571	-16.24
$50,000,000	50131042	16886143	-66.23

The DOLA FRAXBP (17.05M TVL) provides a direct route for DOLA<>FRAX swaps. Worth noting, a 10M FRAX<>DOLA trade incurs positive slippage.

- [ ] **Token Holders**

Holders: 8,219



Transfers | Holders | Info | DEX Trades | Contract | Analytics | Comments

Token Holders Chart

Top 1,000 holders (From a total of 8,219 holders)

First | Page 1 of 20 | Last

Rank	Address	Quantity	Percentage	Value	Analytics
1	Frax Finance: Comptroller	291,864,970.289609227907434388	43.4501%	$291,712,616.78	
2	Curve Finance: Swap	62,558,053.542731654086831014	9.3131%	$62,525,398.24	
3	Uniswap V3: FRAX-USDC	47,381,625.298525351127830077	7.0537%	$47,356,892.09	
4	0xaE3457...800F1CE3	33,649,710.97381171599446219	5.0095%	$33,632,145.82	
5	0x03CB44...410C216d	31,930,220.730955363930743603	4.7535%	$31,913,553.16	
6	0xf86148...3aF5d37c	27,675,045.388827374200744046	4.1200%	$27,660,599.02	
7	0x03B59B...f15036Fa	17,336,353.3464707019000067879	2.5809%	$17,327,303.77	
8	0xf6E697...15C30Ea6	17,044,200.920842713879292839	2.5374%	$17,035,303.85	
9	0x78bB3a...ebB7ef15	10,315,782.877481289367691155	1.5357%	$10,310,398.04	
10	Uniswap V3: DAI-FRAX	9,805,484.023463721288196419	1.4597%	$9,800,365.56	
11	Frax Finance: Treasury 2	9,591,000	1.4278%	$9,585,993.50	
12	0x267fc4...29cCA1e0	8,164,137.619266959236335788	1.2154%	$8,159,875.94	

Utility & Use Case

- ☐ **Does the Token have utility (10)**

sFRAX serves as a staking vault aimed at capitalizing on U.S. Treasury yields. The introduction of sFRAX is aimed to bridge the yield curve gap of FRAX by providing a low-duration savings option. It adheres to a compliant ERC4626 token standard, enabling integration into various protocols, bridges, cross-chain applications, and other platforms. Users can hold sFRAX and earn more FRAX stablecoins passively at the "Frax Staking Rate", which initially was 10% but would then adjust to around 5.4%, aligning with the Fed’s current Interest on Reserve Balances (IORB) rate.

- ☐ **Goal of the token, where is value derived from (10)**

The value of sFRAX is derived from a combination of its yield-generating capabilities, its role in bridging yield curve gaps, its collateralization features, and its integration within the broader DeFi ecosystem. By fulfilling these roles, FRAX contributes to the robustness and utility of Frax Finance.

Competitive Analysis

Competitive Markets & Implementation

- ☐ **Competitor Markets with supply & borrow capacity**

As of October 12th, 2023, no competitor protocol has integrated sFRAX into their lending market.

- ☐ **Competitor Oracle Solutions**

N/A

- ☐ **Notable competitor failures**

N/A

Conclusion

Asset Score

October 12th, 2023: The RWG evaluated Frax making use of our in-house comprehensive asset scoring model. This framework evaluates the relative “risk” of Frax as an asset, using wETH as a benchmark, by considering six essential factors: market capitalization, trading volume, price volatility, token distribution, project fundamentals, and token utility. A breakdown of the Total Asset Score (TAS) follows:

Component	Link/Rationale	Score
Market Capitalization	MCS=min(10, (Frax Supply * Frax Price * 200) /(wETH Supply * wETH price)	10
DEX Trading Volume	TVS =min(10, (30 Day Avg Token Trading Volume * 200 / 30 Day Avg wETH Trading Volume)	9.87
Price Volatility	PVS =min(10, 10 - (Token Log Price Volatility / wETH Log Price Volatility) * 9)	9.85
Token Distribution	Token Distribution Score = min((1- Token Gini Index) * 10 / (1 - wETH Gini Index);10)	6.95

Project Fundamentals	Risk Assessment sFRAX Collateral on FiRM - See Protocol Analysis, and Audits & Bug Bounties Sections	8.66
Token Utility	Risk Assessment sFRAX Collateral on FiRM - See Collateral Analysis Section	10

Total Asset Score

$$TAS = 10 * 0.2 + 9.87 * 0.15 + 9.85 * 0.15 + 6.95 * 0.1 + 8.66 * 0.2 + 10 * 0.2$$

$$TAS = 9.39/10$$

Frax scores exceptionally in all categories, except Token Distribution. A medium score in token distribution indicates that Frax tokens are fairly distributed amongst holders or addresses, potentially resulting in an even distribution of ownership. This distribution speaks to the asset's decentralization, market stability, and deep liquidity.

Parameter Recommendations

When considering the onboarding of sFRAX as a collateral in FiRM, a meticulous approach toward parameter settings is crucial to ensure stability and risk mitigation in the protocol. By mirroring the deployment parameters from the successful DAI DSR FiRM market, we establish a set of guidelines built upon a previously defined structure. Below are the parameter recommendations for sFRAX:

Supply Ceiling	5,000,000 DOLA
Initial Fed Supply	2,500,000 DOLA
Daily Borrow Limit	500,000 DOLA
Firm Global Supply Ceiling	42,000,000 DOLA
Collateral Factor	90%
Liquidation Factor	62.1%
Liquidation Incentive	5%
Minimum Debt Amount	3,000 DOLA

As of proposal 153, all new markets introduced to FiRM will have minimum debt amounts set. The liquidation factor stems from a data-driven analysis outlined in the same proposal; which utilizes minimum debt amount, along with collateral factor, the cost to liquidate a FRAX position, to derive the value. This analysis was carried out here.