Risk Assessment of INV FiRM Market (September '23)

TL;DR

Market	Total Asset Score	Supply Ceiling	Daily Borrow Limit	Collateral Factor	Liquidation Factor	Liquidation Incentive	Minimum Debt Amount
INV	5.39	350,000	25,000	30%	20%	10%	1250

The RWG recommends the following market deployment parameters for FiRM's INV market. See *INV Market* section for more information.

Background

Since April 2022 the DAO has paused new borrowing against INV pending improvements in, among other things, price oracle reliability. Improvements in oracle design along with continued high demand for DOLA borrowing against INV provide us with an opportunity to re-assess the risk profile for INV as collateral on FiRM.

Over recent months, Curve Finance has introduced new pools equipped with built-in EMA oracles which are widely recognized to be manipulation resistant. Tests have shown that at a 10-min EMA, the maximum the price oracle can be manipulated is 4% if an attacker takes over 3 consecutive blocks. At present, these oracles are functional across three FiRM markets, cvxFXS, cvxCRV, and st-yCRV,

Inverse Finance has promptly incorporated these developments, deploying two new LPs; TricryptoINV (composed of INV, USDC, and ETH), and TriDBR (composed of INV, DOLA, and DBR). As of Proposal 132, a new INV price feed utilizing the EMA oracle, sourced directly from the newly instituted TricryptoINV pool is being utilized for the INV market on Frontier, Inverse's deprecated lending market. This feed procures the INV price in terms of USDC, as provided by the pool, which is then translated into a USD valuation leveraging the Chainlink price feed for USDC.

Since Proposal 132, Inverse Finance DAO PoL was migrated from UNI v2 to the TricryptoINV on Curve. With the successful migration of liquidity, the stage is set for this renewed risk assessment. Our overarching objective is to provide in-depth market parameter recommendations and facilitate borrowing against staked INV collateral on FiRM, making use of Curve's resilient EMA oracle.

INV stakers (xINV holders) on FiRM receive rewards in two forms; anti-dilution rewards which are meant to offset potential dilution caused by liquidity-based emissions, and "real yield" received through DBR streaming. The newly available possibility to borrow against ones staked INV collateral on FiRM is an opportunity to create further utility for INV.

Methodologies

Asset Scoring Model

The Analytics Working Group, in close collaboration with the Risk Working Group, has devised a comprehensive, in-house asset scoring model. This framework evaluates the relative “risk” of any asset, using wETH as a benchmark, by considering six essential factors:

- market capitalization,
- trading volume,
- price volatility,
- token distribution,
- project fundamentals; and
- token utility.

We derive the Total Asset Score (TAS) by using the following formula :

$$TAS = 0.2 * (MCS + PFS + TUS) + 0.15 * (TVS + PVS + TDS) + 0.1 * PFS$$

Where:

- MCS : Market Capitalization Score

$$MCS = min(10, (Token\ Supply * Token\ Price * 200) / (wETH\ Supply * wETH\ price) * 10)$$

- TVS : Trading Volume Score

$$TVS = min(10, (30\ Day\ Avg\ Token\ Trading\ Volume / 30\ Day\ Avg\ wETH\ Trading\ Volume) * 10)$$

- PVS : Price Volatility Score

$$PVS = min(10, 10 - (Token\ Log\ Price\ Volatility / wETH\ Log\ Price\ Volatility) * 9)$$

- TDS : Token Distribution Score

$$TDS = min((1 - Token\ Gini\ Index) * 10 / (1 - wETH\ Gini\ Index); 10)$$

- PFS : Project Fundamentals Score

Subjective evaluation (1-10) based on team experience, technology, and roadmap

- TUS : Token Utility Score

Subjective evaluation (1-10) based on token use cases and functionality

The weights were determined based on the relative importance of each factor in evaluating token risk. As we build out a registry of TAS for a variety of collateral options and match them with findings from other risk profiling frameworks and methodologies, the RWG will be able to rely more and more on the Asset Scoring Model.

RWG Risk Assessments

Risk Assessments conducted by the Risk Working Group (RWG) serve to identify, evaluate, and prioritize risks associated with a specific entity, protocol, collateral, or initiative. The purpose of these assessments is to provide a comprehensive and objective analysis of potential risks and their potential impact on Inverse Finance. This information can then be used to inform risk management strategies and decision-making processes, helping to mitigate or minimize the identified risks.

Parameter Recommendations

Parameter recommendations for new markets and changes to existing markets on FiRM are the end result of RWG Risk Assessments and include suggested values for various risk parameters such as the supply ceiling, the collateral factor, daily borrow limit, the liquidation factor, etc. These recommendations serve as a starting point for an informed conversation amongst core contributors and community members alike of Inverse Finance DAO. By providing clear parameter recommendations, the RWG helps to ensure that new markets added to the FiRM protocol are appropriately risk-managed and able to operate in a safe and sustainable manner. This helps to protect the protocol and its users from potential losses and enables the protocol to continue to provide innovative and valuable fixed-rate lending services to the DeFi community.

INV Market

Asset Scoring Model

September 15th, 2023: The RWG evaluated INV making use of our in-house comprehensive asset scoring model. *Project Fundamental* and *Token Utility* were both scored 10 without an accompanying analysis. This is because INV real yield and DBR streaming are sufficient markers to obtain such a score, and because, as core contributors, the RWG can't assess these components objectively. Overall, the TAS came out to be 5.39, an 0.16 increase from when INV was last assessed on May 17th, 2023 and scored 5.23. A breakdown of the Total Asset Score (TAS) follows:

Component	Link/Rationale	Score
Market Capitalization	MCS=min(10, (INV Supply * INV Price * 200) /(wETH Supply * wETH price)	0.37
DEX Trading Volume	TVS =min(10, (30 Day Avg Token Trading Volume * 200 / 30 Day Avg wETH Trading Volume)	0.30
Price Volatility	PVS =min(10, 10 - (Token Log Price Volatility / wETH Log Price Volatility) * 9)	4.49
Token Distribution	Token Distribution Score = min((1- Token Gini Index) * 10 / (1 - wETH Gini Index);10)	6.01
Project Fundamentals	N/A	10
Token Utility	N/A	10

Total Asset Score

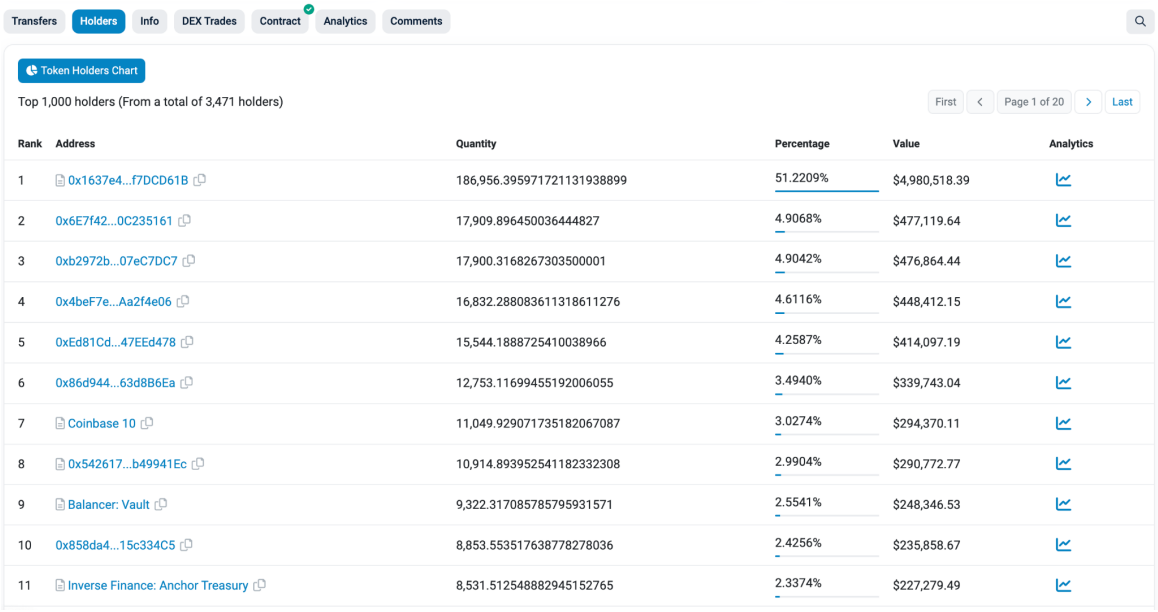
$$TAS = (0.37 * 0.2 + 0.30 * 0.15 + 4.49 * 0.15 + 6.01 * 0.1 + 10 * 0.2 + 10 * 0.2$$

$$TAS = 5.39/10$$

- INV scores poorly in Market Capitalization, indicating that the token's overall market value is relatively low compared to that of wETH. The low market capitalization potentially impacts the liquidity and perceived value of INV in the market.
- INV scores poorly in DEX Trading Volume. Most INV today is traded on centralized exchanges however a poor score indicates that the token experiences limited trading activity on decentralized exchanges. Lower trading volume suggests lower liquidity and may result in challenges when buying or selling INV without significant price impact or slippage. This will be studied in the sections below.
- INV scores fairly poorly in *Price Volatility.* A low score in price volatility suggests that INV price experiences significant fluctuations or instability compared to the benchmark (wETH). However, while INV might score poorly, xINV would score higher (not captured by the Asset Scoring Model) due to the continuously accruing dilution protection rewards. At the same time, real yield via DBR streaming would further improve the Price Volatility score.
- INV scores fairly in Token Distribution. A fair token distribution score suggests that the token's distribution, while not noteworthy, is not uneven. This score doesn't account for the additional distribution within the xINV staking contract, which would further improve INV's Token Distribution score. Nor does it capture the potential for future concentration of tokens among few holders or addresses. Concentrated token distribution raises concerns about centralization, market manipulation risks, and limited liquidity.

Holders

INV Contract Address:
https://etherscan.io/token/0x41d5d79431a913c4ae7d69a668ecdfe5ff9dfb68



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

Token Holders Chart

Top 1,000 holders (From a total of 3,471 holders)

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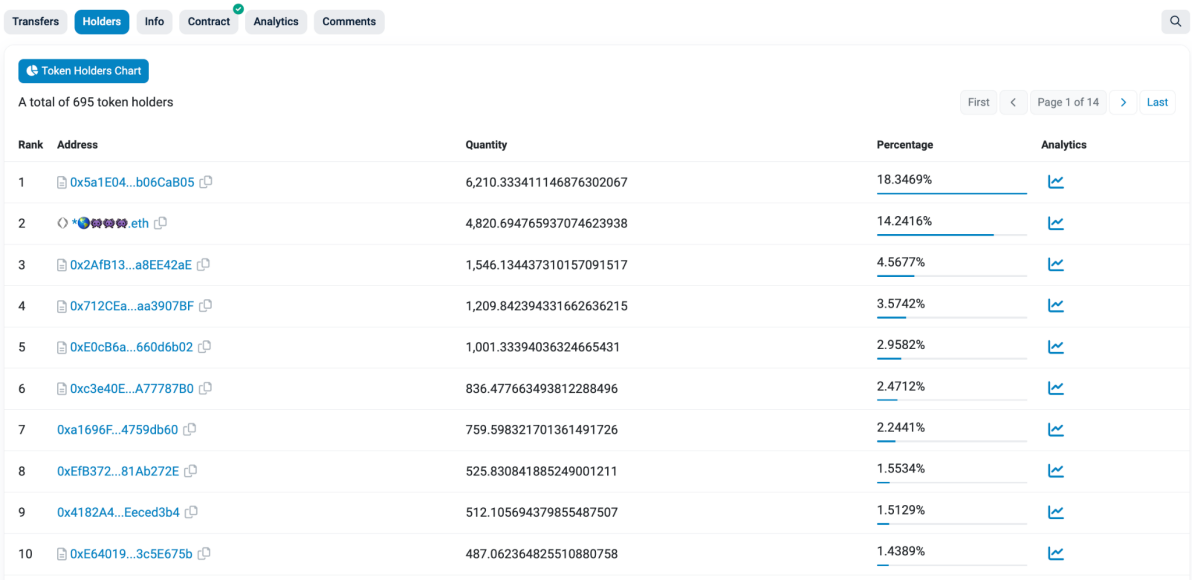
Rank	Address	Quantity	Percentage	Value	Analytics
1	0x1637e4...f7DCD61B	186,956.3959717211319388 99	51.2209%	$4,980,518.39	
2	0x6E7f42...0C235161	17,909.896450036444827	4.9068%	$477,119.64	
3	0xb2972b...07eC7DC7	17,900.3168267303500001	4.9042%	$476,864.44	
4	0x4beF7e...Aa2f4e06	16,832.288083611318611276	4.6116%	$448,412.15	
5	0xEd81Cd...47EEd478	15,544.1888725410038966	4.2587%	$414,097.19	
6	0x86d944...63d8B6Ea	12,753.11699455192006055	3.4940%	$339,743.04	
7	Coinbase 10	11,049.929071735182067087	3.0274%	$294,370.11	
8	0x542617...b49941Ec	10,914.893952541182332308	2.9904%	$290,772.77	
9	Balancer: Vault	9,322.317085785795931571	2.5541%	$248,346.53	
10	0x858da4...15c334C5	8,853.553517638778278036	2.4256%	$235,858.67	
11	Inverse Finance: Anchor Treasury	8,531.512548882945152765	2.3374%	$227,279.49	

→ # of holders (3471) is up 243 since past risk assessment in May, 2023 (3228).

- Staking Contract (Address #1) makes up 51.22% of all INV.

xINV Contract Address:
https://etherscan.io/token/0x1637e4e9941D55703a7A5E7807d6aDA3f7DCD61B



Transfers | Holders | Info | Contract | Analytics | Comments

Token Holders Chart

A total of 695 token holders

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Rank	Address	Quantity	Percentage	Analytics
1	0x5a1E04...b06CaB05	6,210.333411146876302067	18.3469%	
2	*[redacted].eth	4,820.694765937074623938	14.2416%	
3	0x2AfB13...a8EE42aE	1,546.134437310157091517	4.5677%	
4	0x712CEa...aa3907BF	1,209.842394331662636215	3.5742%	
5	0xE0cB6a...660d6b02	1,001.33394036324665431	2.9582%	
6	0xc3e40E...A77787B0	836.477663493812288496	2.4712%	
7	0xa1696F...4759db60	759.598321701361491726	2.2441%	
8	0xEfB372...81Ab272E	525.830841885249001211	1.5534%	
9	0x4182A4...Eeced3b4	512.105694379855487507	1.5129%	
10	0xE64019...3c5E675b	487.062364825510880758	1.4389%	

- # of holders is 695, but holders above $1000 is 177.
- Top 8 Addresses hold >50% of xINV.
- 185 xINV stakers on FiRM.

Delegates

Delegate Top 100

Top delegates by voting weight - Updated every 15 min

Rank		Delegators	Proposals Voted	Votes	Vote Weight
1	Deployer	9	14	34620.17	25.59%
2	[redacted].eth	4	94	31579.95	23.34%
3	CryptoHarry	37	119	10569.69	7.81%
4	0×2CBA...2dfD	4	32	9948.34	7.35%
5	fridged.eth	2	3	5581.72	4.13%
6	PatB	27	92	4878.51	3.61%
7	0xEfB3...272E	1	16	2932.40	2.17%
8	0×4182...d3b4	1	5	2854.62	2.11%
9	0×0447...782f	4	13	2640.89	1.95%
10	kirito.eth	2	2	2615.48	1.93%

Liquidity

LP	Platform	TVL ($)	INV Depth (#)
INV<>USDC<>ETH	Curve	856,474	10,914.89
INV<>DOLA<>DBR	Curve	265,282	3,361.30
INV<>DOLA	Balancer	490,461	9,322.31
INV Liquidity		$1,612,217	23,598.50

Figures are from September 20th, 2023.

Per DefiLlama, INV token liquidity is ~$860k. INV's deepest LPs (presented in the table above) account for $1.6M in total TVL. The Curve tricryptoINV LP is now the deepest source of on-chain liquidity source for INV with ~$856k TVL.

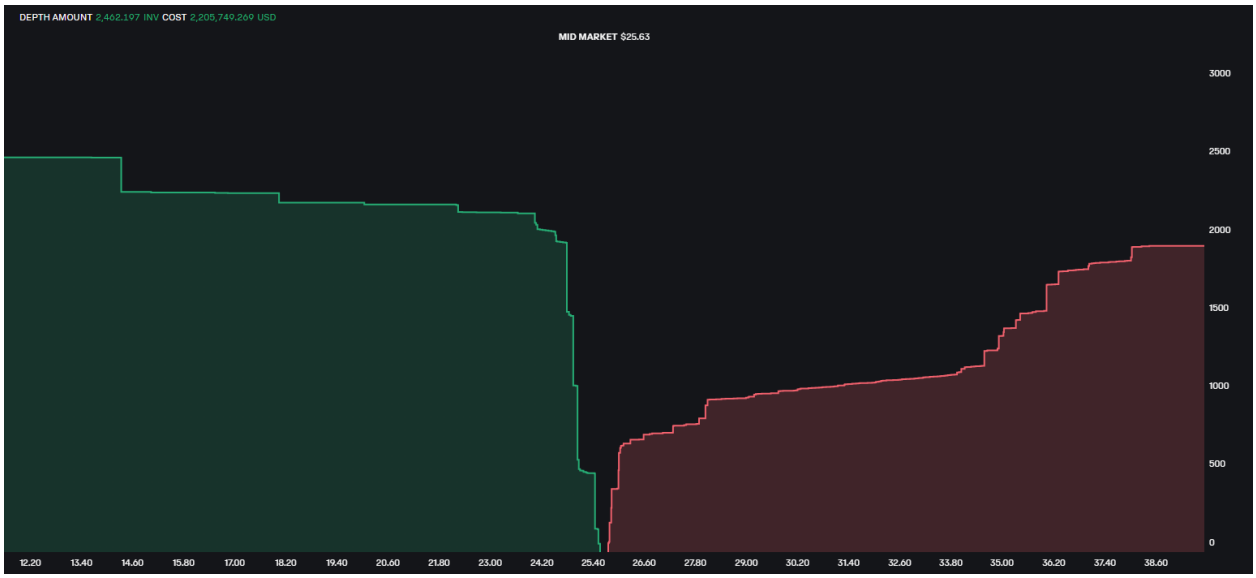
Inverse Finance DAO PoL accounts for 100% of the triDBR LP, 90% of the Balancer TVL, 44% of the tricryptoINV LP. Overall, the DAO holds 16,588.31 of the 23,598.50 INV (70%) in these top 3 LPs. This liquidity can be assumed to be sticky, and guarantees baseline on-chain depth for INV. However, this also suggests INV liquidity distribution is currently poor and is thus an additional cause for concern. This new INV liquidity strategy requires more time to attract more liquidity providers. At the same time, INV liquidity will be further improved once TWG completes the DBR migration it commenced earlier last week.

A follow-up analysis will study INV liquidity providers (data collected for stakers on Convex Finance + Balancer info) if warranted.

INV's CEX liquidity is concentrated into three exchanges and acts to support on-chain DEX liquidity through arbitrage opportunities. Coinbase leads with the highest depth and volume as

seen below.

1	Coinbase Exchange	INV/USD	$25.80	0.82%	$12,190	$919	$37,110	39.39%	Recently
2	Balancer V2	INV/DOLA Live Chart	$25.67	0.6%	$4,681	$4,667	$8,829	9.37%	Recently
3	Sushiswap	INV/WETH Live Chart	$24.84	0.63%	$327	$326	$1,498	1.59%	Recently
4	MEXC	INV/USDT	$25.12	1.15%	$339	$95	$20,678	21.95%	Recently
5	Gate.io	INV/USDT	$25.69	3.07%	$63	$311	$17,784	18.88%	Recently



Slippage Simulations

Liquidators, for an eventual INV market on FiRM, would be required to unstake before opting for the optimal INV->DOLA route. Slippage figures for said trade are shown in the table below.

Trade	INV	DOLA	Slippage (%)
$10,000	375.65	9621	-3.79
$20,000	751.31	18930	-5.35
$40,000	1502.63	36719	-8.20
$60,000	2253.94	53475	-10.88
$80,000	3005.25	69307	-13.37
$100,000	3756.57	84294	-15.71
$200,000	7513.14	148617	-25.69
$400,000	15026.29	229926	-42.52

Figures are from September 20th, 2023.

The ensuing price impact for a liquidation event incurring high slippage could cause a liquidation cascade, and leave INV in an irreparable state. Setting parameter recommendations appropriately can help mitigate this risk.

Price Impact Simulations

A summary of the price impact simulations ran is presented below. Raw data can be viewed here: INV Price Impact Analysis.

INV Sold	INV Sold $	Price Impact (%)
995	25,002	-7.41
2150	54,025	-16.54
2550	64,076	-19.36
4000	100,512	-28.90
7650	192,229	-39.18
8300	208,562	-46.57
12500	314,100	-59.05
13800	346,766	-66.65
20800	522,662	-77.81
23700	595,534	-83.45

Figures are from September 22nd, 2023.

Note: this analysis incorporates both TriCryptoINV and TriDBR LPs on Curve, but not the liquidity in the INV/DOLA LP on Balancer. 90% of these funds are PoL, and will be migrated to the TriDBR LP on Curve in the future. Once this migration has occurred, a new analysis will be performed and parameter recommendations might be adjusted according to results.

Parameter Recommendations

Based on the findings of our research presented above, the RWG recommends the addition of INV as collateral on FiRM using a multi-phase approach beginning with the following initial and conservative market parameters:

Supply Ceiling: 350,000 DOLA

- When setting this parameter, important metrics to consider are INV's market cap and distribution, as well as DOLA's current backing and risk profile. A relatively conservative ceiling reduces exposure to sudden market shocks or price manipulation. By setting the

ceiling at 350,000 DOLA, we're aiming for a balance between catering to potential market demand and ensuring that DOLA isn't overly exposed to the INV market. Furthermore, considering FiRM already has 185 INV stakers, we can expect a healthy borrower distribution. This ceiling allows for enough room to accommodate growing borrower demand while maintaining a safeguard against unforeseen volatility.

Initial Fed Supply: 350,000 DOLA

- The initial fed supply sets the tone for the market's perception of INV within the FiRM ecosystem. By starting with the full amount (supply ceiling) of 350,000 DOLA, we're sending a strong signal. RWG acknowledges this is more of a Growth decision than Risk. The daily borrow limit is what will allow for a buffer for monitoring the market's real-time performance and borrower trends.

Daily Borrow Limit: 25,000 DOLA

- INV's DEX trading volume has been underwhelming. A significant borrowing activity could impact INV's liquidity and price stability in DEXs. Setting a daily limit ensures that there is no sudden rush or spike in borrowing activities, which could lead to price instabilities. Moreover, this limit is designed to avoid over-concentration of INV within a short time frame, further reducing the risk of liquidity challenges.

Collateral Factor: 30%

- The collateral factor is pivotal for determining how much borrowers can borrow against their INV holdings. Despite INV's recognized utility, its low market cap and on-chain liquidity qualifies it as an "at-risk" collateral. The token's volatility score, though not alarmingly low, together with shallow on-chain depth, does suggest potential for significant price fluctuations. Furthermore, liquidity distribution (# addresses holding LP positions) is poor, as shown in the INV market section. However, the DAO controls ~70% of on-chain INV liquidity via its PoL, which is encouraging as it implies this liquidity is "sticky". Slippage and price impact figures are not encouraging, though CEX liquidity helps (Coinbase), and no existing leverage for INV exists, which makes it a much safer collateral at least in its current state. Setting the collateral factor at 30% strikes a prudent balance, allowing borrowers to capitalize on their INV holdings while maintaining a buffer against potential price drops. As INV's asset score improves, collateral factor as well as other parameters can be adjusted accordingly.

Liquidation Factor: 20%

- INV's potential volatility makes it crucial to have a robust liquidation mechanism. The liquidation factor aligns with the collateral factor to protect the interests of lenders. If INV's price were to drop significantly (up to 29% in a single block), this, tied with the collateral factor, ensures there's sufficient collateral to cover potential losses, minimizing the risk to lenders while ensuring that borrowers are not overly penalized.

Minimum Debt Amount: 1250 DOLA

- An important part of protocol security is to make sure that all borrow positions remain liquidatable. In that regard, all debts in the system need to be profitable to liquidate, even in high gas environments. FiRM's upgraded borrowController allows for each market to have an independently set minimum debt amount, to make sure the debt remains adequate as the user is free to repay or get liquidated for a portion of their debt. At 20% liquidation factor, RWG recommends minimum debt amount be set to 1250 DOLA. This allows for 25 DOLA liquidation profit at 10% incentive.

Firm Global Supply Ceiling: 44,350,000 DOLA

- The global supply ceiling takes into account all other FiRM market supply ceilings and tallies them along with the proposed supply ceiling for the INV market.

Regular monitoring of market dynamics, liquidity, and price stability is essential to identify any emerging risks or potential disruptions. Ongoing surveillance and analysis will allow prompt actions to address any issues that may arise. Periodic stress testing of the market under different scenarios should be conducted to assess the resilience of the system and evaluate the impact of increased borrowing activities. Stress testing helps identify vulnerabilities and potential risks that may not be evident in normal market conditions.

Please note that this document serves as a risk assessment and does not constitute final decisions or policy changes. The recommendations should be reviewed and approved by the appropriate stakeholders before implementation.