

Revised Risk Assessment of CRV FiRM Market (December '23)

TL;DR

The RWG recommends the CRV market remain paused, with the expectation that once lending on FiRM has been further diversified and reaches a certain level, the market can be unpaused. All other market parameters should also remain unchanged, therefore no proposal is necessary at this time.

Background

The purpose of this assessment is to evaluate whether it is reasonable, from a risk perspective, to re-enable borrowing in the CRV market in FiRM, Inverse Finance's fixed-rate lending protocol.

The CRV market is FiRM's most utilized market, with \$30.87M in deposits and \$7.69M in borrows, all coming from one user, user A. This user currently has a borrow limit % of 38.31%, and has a history of actively managing their position. Since its inception, the CRV market has undergone several parameter adjustments via governance proposals detailed in the table below. This approach allows the Risk Working Group to propose periodic parameter adjustments to existing markets based on a variety of factors including utilization of the market, changes in risk profile of the underlying asset, etc. Proposed changes might include adjustments in collateral factors, daily borrow limits, liquidation factors, and market supply ceilings and are made to encourage a behavior for existing and new users in the interest of maintaining stability and security for the platform.

CRV Market-related proposals passed through Inverse Finance Governance are presented in the table below. Liquidity figures are from [DeFiLlama](#).

Proposal #	Date	Action	On-Chain Liquidity*
95	March 15	CRV Market Launch	\$25M
108	May 14	CRV Market Parameter Increases	\$32.9M
110	May 27	CRV Market Parameter Increases	\$35.5M
124	August 9	CRV CF Reduction	\$33M
127	August 23	CRV Market Pause	\$27M

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. Past assessments include:

- [Risk Assessment CRV Collateral on FiRM](#)
- [Revised Risk Assessment of CRV and cvxCRV FiRM Markets \(May '23\)](#)
- [Revised Risk Assessment of CRV FiRM Market \(September '23\)](#)

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.

CRV Market

Asset Scoring Model

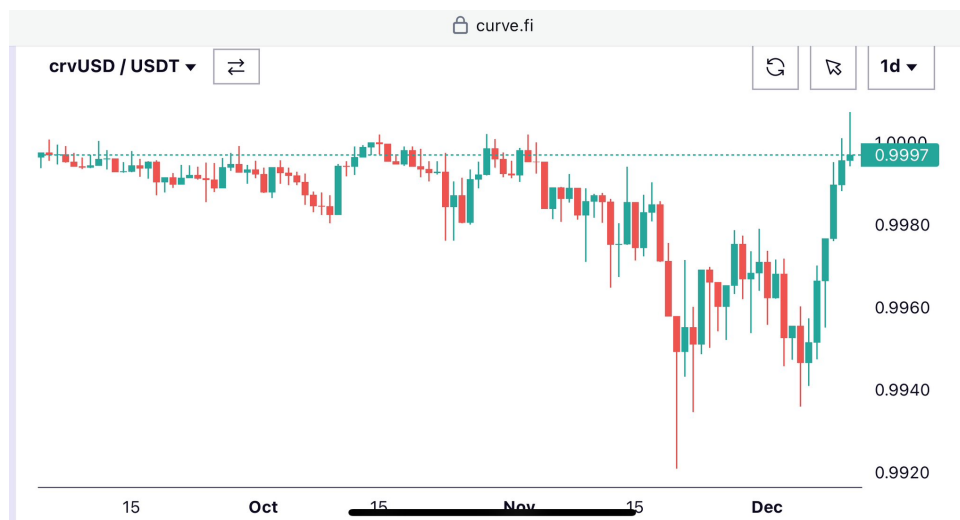
December 12th, 2023: The RWG evaluated CRV making use of our in-house comprehensive [asset scoring model](#). The TAS came out to be 8.09, a 0.22 decrease from when CRV was last assessed on September 15th, 2023 and scored 8.31. Notably, there has been a decrease in DEX Trading Volume and Token Distribution score, and an improvement in Project Fundamentals. A breakdown of the Total Asset Score (TAS) follows:

Component	Link/Rationale	Score
Market Capitalization	$MCS = \min(10, (CRV \text{ Supply} * CRV \text{ Price} * 200) / (wETH \text{ Supply} * wETH \text{ price}))$	10.00
DEX Trading Volume	$TVS = \min(10, (30 \text{ Day Avg Token Trading Volume} * 200 / 30 \text{ Day Avg wETH Trading Volume}))$	6.81
Price Volatility	$PVS = \min(10, 10 - (Token \text{ Log Price Volatility} / wETH \text{ Log Price Volatility}) * 9)$	3.00
Token Distribution	$\text{Token Distribution Score} = \min((1 - \text{Token Gini Index}) * 10 / (1 - wETH \text{ Gini Index}), 10)$	7.73
Project Fundamentals	Risk Assessment CRV Collateral on FiRM - See Protocol Analysis, and Audits & Bug Bounties Sections	10
Token Utility	Risk Assessment CRV Collateral on FiRM - See Collateral Analysis Section	9.25
Total Asset Score		
$TAS = 10 * 0.2 + 6.81 * 0.15 + 3.00 * 0.15 + 7.73 * 0.1 + 10 * 0.2 + 9.25 * 0.2$		
$TAS = 8.09 / 10$		

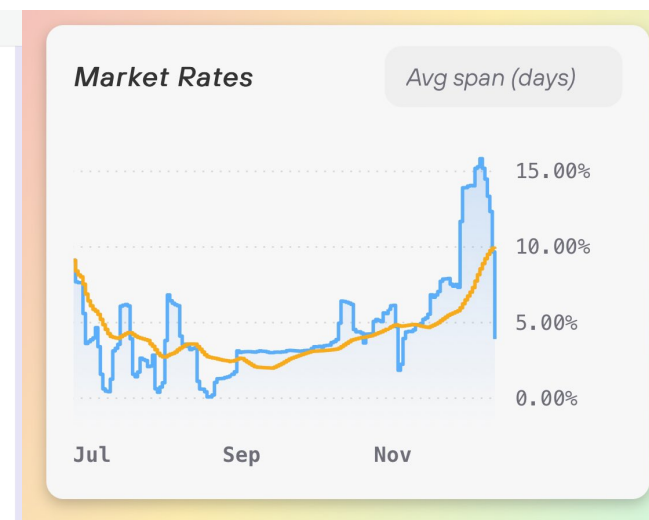
CRV scores poorly in *Price Volatility*. A low score in price volatility suggests that CRV price experiences significant fluctuations or instability compared to the benchmark (wETH). This volatility indicates a higher level of risk associated with CRV's price movements, which is studied below.

The *Project Fundamentals* score has been revised and now scores 10/10 (prev. 9.25/10). This is due to the advent and growing success of crvUSD, which is making up an increasing percentage of veCRV rewards issued. A snapshot of historic veCRV weekly fees pre- and post-crvUSD is maintained by the RWG and can be viewed here:

📈 **veCRV Weekly Fees w/ crvUSD**. In summary and as of December 12th, 2023, accounting for outliers, weekly veCRV fees are up 9.21% since the introduction of crvUSD (sample size: 48 weeks; 20 pre-crvUSD, 28 post-crvUSD). The expectation is for this trend to continue (crvUSD to continue to grow in adoption), as the lending market has proven to attract many users even at “elevated” borrowing rates, and crvUSD has demonstrated its resilience after facing a recent stress-test (see below).



Source: [crvUSD/USDT LP](https://crvusd.usdt.lp)



Source: [Curve Finance Twitter](https://twitter.com/curve_finance)

Holders

CRV Contract Address:

<https://etherscan.io/token/0xD533a949740bb3306d119CC777fa900bA034cd52>

Token Holders Chart					
Top 1,000 holders (From a total of 82,153 holders)					
<div> <div>First</div> <div><</div> <div>Page 1 of 20</div> <div>></div> <div>Last</div> </div>					
Rank	Address	Quantity	Percentage	Value	Analytics
1	Curve.fi: Voting Escrow	778,800,358.954796137125672741	37.9996%	\$507,768,491.86	📈
2	0x96eFdF...180dAeB9	206,809,246.667276498325231946	10.0907%	\$134,837,148.03	📈
3	0xd2D435...45dB0F1D	139,529,796.229149265426961614	6.8080%	\$90,971,753.40	📈
4	0xe39972...4F513267	123,915,151.508104298801973224	6.0461%	\$80,791,192.35	📈
5	Binance 8	87,670,462.68	4.2777%	\$57,160,090.01	📈
6	0x3835a5...9a752510	63,029,655.446540211505856394	3.0754%	\$41,094,579.27	📈
7	0x73F8AF...79A88F7	47,143,760.486609849492124087	2.3003%	\$30,737,166.32	📈
8	OKX	38,864,399.227433066096451611	1.8963%	\$25,339,122.09	📈
9	0x2A7d59...2d28AC04	24,049,052.99037636708154419	1.1734%	\$15,679,694.07	📈
10	0x679FCB...e3F8fA67	23,573,670.494355146720470072	1.1502%	\$15,369,750.38	📈

From the holders table on Etherscan, we notice deep Curve liquidity on CEXs. Binance-labelled addresses appear 5th and 14th in largest holders' rank with over 100MM CRV, and OKX ranks 8th with over 38MM CRV, an increase from September when it held 23MM.

One holder, above all, is of interest; user A. User A's CRV and CRV-derivative positions on lending markets are tracked by the RWG and can be viewed here: [📈 User A Dashboard](#).

Lending Market	Tokens	Collateral (\$)	Debt (\$)	LTV (%)	Borrow Limit (%)	Liquidation Price (\$)
FiRM	47,143,760	30,586,872	7,689,209	65%	38.68%	0.251
FraxLend	62,439,325	40,510,634	13,173,511	75%	43.36%	0.281
C.R.E.A.M.	14,200,000	9,212,960	2,571,825	70%	39.88%	0.259
Silo Finance (#1)	86,038,444	55,821,742	15,901,773	65%	43.83%	0.284
Silo Finance (#2)	41,650,066	27,005,903	7,500,856	65%	32.68%	0.212
Silo Finance (#3)	38,851,488	25,191,305	6,957,606	65%	32.49%	0.211
Silo Finance (#4)	22,129,428	14,348,768	4,108,126	65%	33.68%	0.218
Silo Finance (#5)	20,526,662	13,309,487	3,779,754	65%	33.41%	0.217
CRV TOT	332,979,173	215,987,671	61,682,660	67%	38.81%	0.253
FiRM (#1)	19,033,858	11,718,934	2,333,084	48%	41.48%	0.255
FiRM (#2)	5,119,900	3,152,265	657,877	48%	43.48%	0.268
FiRM (#3)	812,197.32	500,060.83	98,595	48%	41.08%	0.253
cvxCRV TOT	24,965,955	15,371,260	3,089,556	48%	41.87%	0.258
FiRM	400,025	248,068	35,000	48%	29.39%	0.182
yCRV TOT	400,025	248,068	35,000	48%	29.39%	0.182
Grand Total	358,345,153	231,606,999	64,807,216	66.17%	38.95%	0.253

As of December 12th, 2023, the RWG has identified 8 CRV positions held by user A across 7 addresses and 4 lending protocols, totalling 333MM CRV. User A also holds 3 cvxCRV positions, and 1 yCRV position, all on FiRM. Cumulatively, user A holds \$64.8MM debt against \$231.6MM in CRV + derivative collateral, with an average borrow limit of 38.95% and an average liquidation price of 0.253 (a 61% drawdown from current prices).

Liquidity

The Curve CRV/ETH LP was the deepest on-chain liquidity source for CRV prior to the July exploit. The LP was vulnerable to the bug discovered to be present in older versions of the Vyper compile and was drained alongside other Curve pools. It has since been deprecated and replaced with the triCRV LP, composed of crvUSD, wETH, and CRV. As of September 21st, 2023, the triCRV had TVL of \$18.1MM, and as of December 12th, 2023 the TVL is \$18.3MM. This LP is by far the deepest on-chain pool. Data collected of triCRV stakers on Convex Finance can be accessed here: [x triCRV_LP_Stakers_Convex.xlsx](#)

December 12th Snapshot		September 15th Snapshot	
Total LP Balance	505915.686	Total LP Balance	651323.6702
LP Token Value (\$)	34.98	LP Token Value (\$)	27.09
TVL	\$17,696,930.70	TVL	\$17,644,358.23
Top 3 Addresses (%)	59.57%	Top 3 Addresses (%)	57.30%
Top 10 Addresses (%)	84.69%	Top 10 Addresses (%)	89.10%
Top 50 Addresses (%)	99.22%	Top 50 Addresses (%)	99.67%
# Addresses above \$100,000	18	# Addresses above \$100,000	15
# Addresses above \$50,000	27	# Addresses above \$50,000	22
# Addresses above \$10,000	52	# Addresses above \$10,000	42

The table above suggests little has changed since September 15th. Aside from the appreciation in LP Token Value, there's a slightly higher concentration amongst the top 3 addresses and a lower amongst the top 10 addresses. Analysis suggests CRV liquidity distribution remains poor and is thus an additional cause for concern. The triCRV LP is now 5 months old, so sufficient time has passed since inception to draw conclusions.

Slippage Sims

CRV FiRM Market Liquidation Factor is 20% and user's current position is 47,143,760 CRV, hence 9,428,752 CRV would be liquidatable if position goes underwater. Even utilizing the optimal route (CRV->crvUSD->DOLA), slippage for liquidators is estimated to be ~32% (shown in last entry of the table below).

Trade	CRV	crvUSD	DOLA	Slippage (%)
\$100,000	153258	99211	99336	-0.66
\$200,000	306516	197358	197590	-1.21
\$400,000	613032	389540	389938	-2.52
\$600,000	919548	576983	577562	-3.74

\$800,000	1226064	759899	760578	-4.93
\$1,000,000	1532581	938389	939128	-6.09
\$2,000,000	3065162	1753777	1754329	-12.28
\$6,151,459	9428752*	4182384	4177871	-32.08

This is an improvement from 38% (from September 15th), but still a cause for concern, as the ensuing price impact for a liquidation event incurring a 32% slippage would be significant enough to cause a liquidation cascade and leave lending protocols such as FiRM with high odds of incurring bad debt.

Parameter Recommendations

Based on the findings of our research presented above, the RWG recommends the CRV market remain paused, with the expectation that once lending on FiRM has been further diversified and reaches a certain level, the market can be unpaused. All other market parameters should also remain unchanged, therefore no proposal is necessary at this time.

There are ample signs to suggest that CRV as a collateral option looks much improved from August, when risk-centric proposals were drafted to pause the CRV + derivatives markets on FiRM and make targeted changes to the collateral factors and liquidation incentives of the markets. However, FiRM remains too concentrated on CRV based lending. Furthermore, the present day liquidity picture for CRV is still a cause for concern as on-chain liquidity remains shallow and in the hands of few liquidity providers. If one or more were to remove their funds from the triCRV LP, the situation could deteriorate rapidly. Because of this, we recommend any future increase in market parameters or new liquidity in the market be carefully evaluated. Were the liquidity situation to worsen, RWG may recommend additional parameter changes to further bolster the security of the 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.