HALBORN

TECHNICAL GUIDANCE NOTE

DIGITAL ASSETS AND DECENTRALIZED FINANCE STANDARDS

A Framework for Measuring, Assessing, and Rating Risk in Stablecoins

VERSION 1.03

Introduction

Stablecoins have emerged as pivotal instruments within the ecosystems of decentralized finance (DeFi) and broader cryptographic asset markets, garnering heightened scrutiny due to their critical function as digital representations of the U.S. dollar operationalized on blockchain networks.

These assets are engineered to execute a technically intricate task: maintaining a stable peg to the U.S. dollar, even amidst episodes of pronounced market volatility. Nevertheless, recent years have witnessed multiple instances of stablecoins deviating from their pegs on secondary markets during periods of acute systemic stress. Extensive analytical efforts have probed the intrinsic stability—or inherent vulnerabilities—of various stablecoin architectures, yet each successive market disruption unveils novel and idiosyncratic risks affecting distinct stablecoin implementations.

A paradigmatic illustration of these dynamics and challenges materialized during the events of March 2023, when Circle, the issuer of USD Coin (USDC), disclosed its inability to transfer a segment of USDC reserves held at Silicon Valley Bank prior to the institution's seizure by regulatory authorities. This disclosure precipitated a significant de-pegging of USDC from its U.S. dollar parity, with cascading effects on the pricing of other stablecoins as market participants reacted to the unfolding developments.

The confluence of factors surrounding the March 2023 events renders them particularly compelling for researchers endeavoring to elucidate the multifaceted complexities of stablecoin markets. This guidance note undertakes a rigorous examination of these factors, with a particular focus on delineating the depegging factors in stablecoins, and proposes a standard framework for which a risk analysis and assessment can be performed.

The analysis commences with a detailed exposition of the mechanisms governing stablecoin collateralization, issuance on primary markets, and their divergent technical architectures to provide a granular approach for measurement, assessment and rating risk from a broad perspective. From this analytical framework, several overarching insights are derived regarding the behavioral characteristics of stablecoin markets under conditions of acute stress, and the likelihood of an incident, such as a depegging event or create further economic instability that spills over from decentralized finance onchain, and into traditional financial markets.

Foreward

Stablecoins have grown exponentially, with transaction volumes exceeding $5 trillion globally by 2025, driven by institutional adoption and increasing regulatory clarity in several advanced economic regions. However, their integration into the broader economy requires careful management to avoid risks like depegging events (e.g. TerraUSD's collapse) or systemic vulnerabilities.

A standard framework to provide and approach for risk management is presented further in this document to provide support for ratings agencies, analysts, and asset managers with a robust tool for evaluating stablecoins. This document draws on the latest regulatory developments as of 2025, including the GENIUS Act, CLARITY Act, and SEC guidance, alongside empirical data on stablecoin performance and risks.

The framework emphasizes peg stability, risk mitigation, and strategies to enable mass adoption without causing adverse economic impacts such as monetary policy disruptions or financial instability.

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1. Definition and Taxonomy of a Stablecoin

A stablecoin is a type of digital asset designed to maintain a stable value relative to a reference asset, typically a fiat currency such as the U.S. dollar (USD). Stability is generally achieved through mechanisms such as collateral backing, algorithmic adjustments, or economic incentives embedded within the protocol design. Unlike volatile cryptocurrencies such as Bitcoin, stablecoins aim to provide price stability to facilitate payments, remittances, and value storage within digital ecosystems.

Stablecoins constitute a specialized subset of cryptographic assets engineered to preserve a consistent valuation relative to a non-cryptographic reference asset, most commonly the U.S. dollar, which currently dominates the stablecoin market. In contrast to other cryptographic assets whose valuations are often volatile and speculative, stablecoins are designed to function as a reliable store of value and medium of exchange within digital financial systems.

The rapid proliferation of stablecoins has contributed to their widespread use across decentralized finance (DeFi) markets, cryptocurrency exchanges, and emerging blockchain-based financial applications. They frequently serve as an entry point for participants engaging with the broader cryptocurrency ecosystem while also supporting liquidity and settlement across digital asset markets.

Given the diversity of stablecoin implementations, a structured taxonomy is necessary to understand the mechanisms through which these systems maintain their price stability.

1.1. Stablecoin Design Taxonomy

Stablecoins can be broadly categorized based on their collateralization structure and stabilization mechanisms. At a high level, stablecoins are typically grouped into three primary design categories:

- Fiat-collateralized stablecoins
- Crypto-collateralized stablecoins
- Algorithmic (or uncollateralized) stablecoins

These categories reflect the primary mechanism through which the stablecoin attempts to maintain its peg. The structural design of the stabilization mechanism significantly influences a stablecoin's effectiveness as a medium of exchange or store of value, as well as the degree of centralization or decentralization embedded within its operational framework.

In addition to these core design categories, stablecoins may employ different stabilization approaches or economic mechanisms—such as rebase adjustments or seigniorage systems—to maintain their peg.

2. Stablecoin Asset Classes

Within the broader design taxonomy, stablecoins may also be classified according to the mechanisms used to maintain peg stability. These asset classes include collateralized, rebase, algorithmic, and seigniorage-based systems, each of which employs distinct approaches to price stabilization and carries different risk characteristics.

2.1. Collateralized Stablecoins

Collateralized stablecoins maintain their value through reserves that support the circulating supply of tokens.

Fiat-Collateralized

Fiat-collateralized stablecoins are backed by fiat currencies or cash-equivalent financial instruments. Issuers typically hold U.S. dollars or short-term Treasury securities in reserves equal to or exceeding the circulating supply of the stablecoin.

These reserves may consist of bank deposits, Treasury securities, money market instruments, or similar financial assets. In most implementations, a centralized issuer is responsible for minting tokens on public blockchains at a 1:1 parity with fiat reserves held off-chain.

The issuer therefore bears responsibility for ensuring that the total quantity of tokens issued does not exceed the dollar-denominated value of the reserves held in custody, thereby maintaining the integrity of the peg.

Crypto-Collateralized Stablecoins

Crypto-collateralized stablecoins are supported by digital assets held within smart contracts. These collateral pools may include cryptocurrencies such as Bitcoin or Ethereum, as well as other digital assets.

Because the underlying collateral can be volatile, these systems typically require over-collateralization. Users deposit a predetermined quantity of crypto assets into a protocol, which then mints stablecoins at a conservative collateral ratio. If the value of the collateral falls below a specified threshold, automated smart contract mechanisms initiate liquidation processes to maintain the peg.

Commodity or Asset-Backed Stablecoins

Some stablecoins are backed by physical assets or other real-world assets rather than fiat currency. Examples include gold-backed stablecoins in which each token represents a claim on a specified quantity of physical gold held in custody.

These designs extend the concept of collateralized stablecoins beyond fiat reserves and allow blockchain tokens to represent ownership of traditional assets within digital markets.

2.2. Rebase Stablecoins

The operational framework of rebase stablecoins emulates the monetary policy strategies of central banks, which manipulate money supply to achieve macroeconomic objectives such as price stability.

By employing supply-side adjustments, rebase stablecoins aim to mitigate price volatility inherent in cryptographic asset markets, thereby positioning themselves as viable stores of value and media of exchange within decentralized finance (DeFi) ecosystems. Unlike fiat-collateralized or crypto-collateralized stablecoins, rebase stablecoins do not offer direct redemption for fiat currency or other assets. Instead, their stability hinges on the market's collective confidence in the protocol and the willingness of token holders to retain their positions during periods of supply contraction, which can reduce individual balances and test investor sentiment.

The rebase mechanism is governed by a set of smart contracts that continuously monitor market price data, typically sourced from decentralized oracles or aggregated exchange feeds, to determine the magnitude and direction of supply adjustments. These smart contracts execute rebases autonomously, recalibrating the token supply through minting or burning operations to align the circulating supply with the economic incentives required to stabilize the price. This process introduces a dynamic equilibrium, wherein the protocol's algorithmic interventions seek to counteract market-driven price fluctuations without relying on exogenous reserve assets.

Technical and Economic Implications

The absence of direct collateralization distinguishes rebase stablecoins from their fiat- or crypto-backed counterparts, rendering them highly dependent on market dynamics and participant behavior. The success of the rebase mechanism presupposes a robust and liquid market, as well as sustained holder confidence, particularly during contractionary rebases that diminish individual token holdings. Such contractions can precipitate sell-offs if participants perceive the reductions as a signal of instability, potentially exacerbating downward price pressure and leading to destabilizing feedback loops, akin to those observed in other algorithmic stablecoin failures. Furthermore, the reliance on external price feeds introduces vulnerabilities to oracle manipulation or inaccuracies, necessitating robust data integrity protocols to ensure reliable rebase calculations.

Rebase stablecoins automatically adjust their total supply to maintain the peg, without direct collateral. The protocol "rebases" daily based on market price: if above the peg, supply expands (increasing holders' balances proportionally); if below, supply contracts.

How they work: This elastic supply mimics central bank monetary policy, aiming for price stability through supply-side adjustments. No redemption for fiat; stability relies on market participants' willingness to hold during contractions.

In summary, rebase stablecoins represent an innovative approach to achieving price stability through algorithmic supply modulation, drawing parallels to central bank monetary policy while operating within the decentralized paradigm of blockchain technology. Their efficacy, however, is contingent upon market participants' trust and the protocol's ability to navigate the complex interplay of supply adjustments, price dynamics, and external data dependencies, underscoring both their potential and their inherent risks within the evolving landscape of DeFi and stablecoin ecosystems.

2.3. Algorithmic Stablecoins

Algorithmic stablecoins are similar to crypto-backed stablecoins in that they both operate in non-custodial arrangements using smart contracts, but there is a key difference. Crypto-backed stablecoins have reserve assets that exist apart from the stablecoin arrangement, whereas algorithmic stablecoins use another digital asset within the same arrangement to maintain their peg. That is, the value of the digital asset backing an algorithmic stablecoin depends on the stability of the stablecoin itself. This is commonly referred to as endogenous backing. Algorithmic stablecoins use smart contracts and incentives to control supply and demand without full collateral. Algorithms mint or burn tokens based on price deviations, often using bonding (selling at discount) or incentives like yield farming.

How they work: When price > peg, the protocol encourages selling by minting more; when price < peg, it burns tokens or offers incentives to buy. This creates a feedback loop, but it can fail in low confidence scenarios which increase risk of a depeg spiral.

An endogenously backed algorithmic stablecoin involves two tokens: a stablecoin with an intended fixed face value, and an investment token with a floating value. The algorithm enables each token to be converted into the other at a ratio determined by the investment token's market price. For example, if the investment token has a market price of $10, and the stablecoin has a face value of $1.00, one stablecoin can be converted into one-tenth of an investment token. So long as the investment token has a non-zero market value, and the aggregate value of the investment tokens is greater than the combined face value of all minted stablecoins, the stablecoin should in theory be able to maintain its peg.

The primary weakness of algorithmic stablecoins is that their value could collapse if confidence wanes in the stablecoin arrangement as a whole – a so-called "death spiral." As seen with the Terra USD stablecoin (UST), which was endogenously backed by LUNA tokens, it can be difficult for an algorithmic stablecoin to maintain its peg to a fiat currency. LUNA tokens had a floating value based on their utility in the Terra ecosystem and served as the shock absorber for UST.

When UST began to lose its peg on May 9, dropping below $1, speculators could buy and swap the discounted UST for $1 of LUNA. In theory this arbitrage should have driven the price of UST back to $1. In practice, the LUNA token was unable to maintain its value and support the arbitrage.

Each UST coin burned required new LUNA tokens to be minted, and the supply of LUNA

ballooned, diluting its value. Moreover, the demand for minting new LUNA was so strong that the network became congested, more costly, and unable to keep up. As a result, the price of LUNA dropped on trading platforms. The loss of confidence in UST fueled a loss in confidence in LUNA, which fueled a loss in confidence in UST – accelerating into the death spiral of a stablecoin that as of May 8 had a market cap of more than $18.6 billion.

2.4. Seigniorage Stablecoins

Seigniorage stablecoins, a subset of algorithmic, use a multi-token system involving the stablecoin, “shares” (for seigniorage profits), and “bonds” (to absorb losses). Examples include Basis (unlaunched) or ESD (Empty Set Dollar). Profits from minting (seigniorage) are distributed to share holders; during contractions, bonds are issued at discount to recapitalize.

How they work: Expansion phases reward holders; contraction phases issue bonds redeemable later, shifting risk to bond buyers. This gamifies stability but relies on continuous growth.

3. Executive Summary

Stablecoins have become a central component of digital asset markets, supporting trading, payments, settlement, and liquidity across blockchain networks. By representing fiat-denominated value on-chain, stablecoins enable the movement of capital between decentralized systems and traditional financial markets while maintaining the programmability and transparency of blockchain infrastructure.

Despite their intended price stability, stablecoins exhibit a wide range of risk characteristics depending on their underlying design, collateral structure, governance model, and technical implementation. Differences in these factors can materially affect a stablecoin's ability to maintain its peg and operate reliably during periods of market stress.

Recent market events have demonstrated that stablecoin stability cannot be evaluated solely through price behavior during normal market conditions. Operational disruptions, reserve composition, liquidity constraints, governance decisions, and broader financial market conditions can all influence a stablecoin's resilience. As stablecoins continue to grow in scale and integration with financial systems, the ability to systematically evaluate these risks becomes increasingly important.

This document introduces a structured framework for analyzing and assessing stablecoin risk. The framework evaluates stablecoins across multiple dimensions, including peg stability, collateral structure, liquidity conditions, governance, technical security, and market adoption. By applying a consistent methodology, the framework enables analysts, asset managers, and other market participants to compare stablecoin designs and identify potential vulnerabilities.

The objective of the framework is to provide a practical and transparent approach to stablecoin risk assessment that supports institutional due diligence, market analysis, and ongoing monitoring as the stablecoin ecosystem continues to evolve.

3.1. Analysis of Stablecoin Valuation Challenges

When evaluating the valuation or revaluation of stablecoins, a critical question emerges: This inquiry persists irrespective of whether a cost-based or fair value (FV) accounting approach is deemed appropriate under extant financial reporting frameworks for analogous assets, or whether a valuation is necessitated for purposes such as acquisition, disposal, or impairment analysis.

Determining a current valuation is frequently imperative in these contexts. Divergent perspectives exist on this matter: some advocate for valuing a stablecoin at the current value of its pegged or reserved currency, while others propose marking an actively traded stablecoin to its market price.

For instance, stablecoins such as Tether or Paxos, which are purportedly backed on a 1:1 basis with the U.S. dollar, may exhibit price fluctuations across various global exchanges.

These variations may arise from market-driven premiums or discounts influenced by factors such as transaction costs, trading volume, supply and demand dynamics, jurisdictional differences, and inherent market risks. Although, in theory, a fully reserved stablecoin maintains a one-to-one correspondence with a U.S. dollar in reserve—often substantiated through periodic independent audits—price deviations are invariably observed in active market trading due to these multifaceted factors.

Stablecoins pegged to fiat currencies are typically “minted” (created) or “burned” (retired) in response to market demand, ensuring that the reserve backing remains fully intact at all times. While the issuance or redemption of a fiat-backed stablecoin is generally executed at the prevailing value of the reserve currency, the valuation for tax or financial reporting purposes is typically required to be aligned with the “principal market” at the “last observable price,” as stipulated by fair value accounting principles under U.S. Generally Accepted Accounting Principles (ASC 820) and International Financial Reporting Standards (IFRS 13).

These authoritative fair value standards provide both U.S. and non-U.S. entities with precise guidance on the methodologies, inputs, and requisite disclosures for fair value measurements. Notably, these standards do not prescribe when fair value measurements are mandated or permitted; rather, they delineate the procedural framework for determining fair value once it is established as the appropriate valuation methodology.

Actively traded stablecoins, along with other cryptographic assets, are particularly amenable to the application of these fair value accounting guidelines due to their high transaction volumes and the availability of observable prices in principal cryptocurrency markets. The convergence of U.S. and international accounting standards further reinforces the consistency of these guidelines, ensuring robust and standardized approaches to valuation inputs and disclosures for assets exhibiting characteristics akin to stablecoins.

4. Enhanced Rating Components

4.1. Digital Assets & Decentralized Finance Standards

Market & Financial Integrity

- Peg Stability
- Liquidity Depth
- Capital Adequacy

Governance & Legal Oversight

- Governance
- Regulatory Factors
- Centralization
- Custodial/Counterparty

Operational & Technical Risk

- Technical Security
- Operational Reliability
- Interoperability

Systemic & Stakeholder Impact

- Systemic Exposure
- Consumer Protection
- Relevance & Adoption

5. Peg Stability Threats

Counterparty Incident

The efficacy of a counterparty's performance is critical, as deficiencies in financial stability, operational integrity, legal standing, or regulatory compliance can jeopardize a stablecoin's ability to maintain its peg to the reference asset. For centralized stablecoins—issued by entities that also oversee reserve assets—risks of insolvency or fraudulent conduct may precipitate significant losses for holders, particularly where reserves are not held within a distinct special purpose vehicle or where creditor rights are not explicitly defined.

Technological Flaw

Inherent technological vulnerabilities or structural design deficiencies, as exemplified by the catastrophic collapse of TerraUSD in May 2022, can precipitate a permanent deviation from the peg, potentially rendering a stablecoin inoperative and eroding its viability in the marketplace.

Cybersecurity Incident

Susceptibility to malicious cyberattacks, such as hacking schemes, poses a substantial threat to the stability of a stablecoin's valuation, potentially triggering a depeg event that undermines its intended parity with the underlying asset.

Operational Issue

Operational risks stemming from network congestion or inefficiencies can impede the timely execution of payment flows, thereby compromising the mechanisms designed to ensure the stablecoin's stability and reliability.

Adoption Weakness

Limited market adoption may curtail trading volume and market capitalization, consequently diminishing liquidity and exerting adverse effects on the stablecoin's valuation, as low liquidity can amplify price volatility and undermine confidence.

Regulatory Action

Regulatory ambiguity or the imposition of legal actions may erode market confidence, restrict liquidity, and hinder the stablecoin's ability to maintain its peg, as uncertainty in the legal or regulatory environment can deter investor participation and market activity.

Financial Market Event

Turbulence within broader financial markets can reverberate throughout the stablecoin ecosystem, exerting downward pressure on a stablecoin's valuation and precipitating depeg events, as macroeconomic shocks or market disruptions spill over into the digital asset space.

Market Volatility

Fluctuations in market volatility can exert downward pressure on a stablecoin's price, potentially destabilizing its value. Conversely, such volatility may precipitate a flight to quality, wherein investors seek refuge in stablecoins as a reliable store of value, thereby increasing demand and potentially elevating the stablecoin's price above its intended peg.

Liquidity Stress

Liquidity constraints, triggered by heightened market volatility, can disrupt the balance of supply and demand, leading to distortions in the stablecoin's price relative to its peg, as market participants struggle to execute transactions efficiently in strained conditions.

Reserves Impairment

Degradation or impairment of the reserves or assets underpinning a stablecoin may result in inadequate collateralization, undermining investor confidence and potentially precipitating legal repercussions as stakeholders question the integrity of the backing mechanism.

Collateral Mismanagement

Ineffective or imprudent management of reserves and collateral assets can jeopardize the stability of a stablecoin's valuation, increasing the likelihood of a depeg event that disrupts its parity with the reference asset.

Supply/Demand Imbalance

A sudden surge in demand, whether driven by genuine market interest or manipulative practices, can propel the stablecoin's price above its $1 peg. Conversely, diminished demand coupled with an oversupply can exert downward pressure on the peg, causing the price to fall below its intended value.

Public Sentiment

A lack of transparency in operations or governance, coupled with an erosion of investor confidence, can trigger widespread sell-offs, as market participants seek to exit positions en masse, further destabilizing the stablecoin's valuation and market standing.

6. Mapping Basel Definitions to Stablecoin Total Risk

6.1. Basel Pillars to Stablecoin Framework Layers

Pillar Layer 1: Inherent Risk Score

Risk Category scoring and Documented evidence requirements based on quantitative/qualitative rating.

Pillar Layer 2: Liquidity & Funding Treatment

- LCR/NSFR mappings & stress horizons.
- Liquidity ratios to ensure a stablecoin can withstand periods of financial stress without impacting redemption and market depth.
- Requires a stablecoin to be collateralized with enough high-quality liquid assets (HQLA) that can be easily converted to fiat to cover its net cash outflows during a 30-day stress scenario.

Pillar Layer 3: Crypto-native failure modes and scenarios

Scenario modules that Basel doesn't natively encode:

- Smart contract exploits scenario (loss severity + time-to-recover)
- Bridge failure scenario (segmentation + wrapped asset discounting)
- Synthetic hedge regime break (negative funding + counterparty failure)
- Redemption rail disruption (banking partner outage, on/off ramp issues, or chain connectivity loss)
- DeFi cascade (collateral drawdown + liquidation spiral + oracle stress

7. Stablecoin Risk Evaluation Framework

In the following, the set of evaluation criteria presents a structured approach for assessing the risk of a stablecoin asset. Each criterion is defined, paired with a suggested evaluation method, and accompanied by a qualitative scoring scale (High/Medium/Low) to support consistent and transparent assessments. Users are encouraged to apply this framework when reviewing existing stablecoin assets, or stablecoin asset derivatives, providers, or protocols relying on the asset as a core component to reliable function.

This framework is created to apply the result (High/Medium/Low analysis) of a mutually exclusive evaluation for each of the assessment categories, and insert the result as a weighted coefficient into the Total Risk Rating (TRR). The TRR represents a holistic representation of the total risk inherent in the stablecoin asset under assessment, and falls within the numerical range of 0 (Minimal Risk) to 1 (Extreme Risk).

7.1. Calculating Total Risk Rating (TRR)

Stablecoin Risk Evaluation Framework

Assessment Category	Category Weight	Risk Weight	Evaluation Details	Risk Rating
Peg Stability	10%	–	—	0.000
Centralization	10%	–	—	0.000
Liquidity Depth	10%	–	—	0.000
Technical Security	10%	–	—	0.000
Regulatory Factors	8%	–	—	0.000
Counterparty/Custodial	7%	–	—	0.000
Governance	7%	–	—	0.000
Systemic Exposure	7%	–	—	0.000
Interoperability	7%	–	—	0.000
Operational Stability	7%	–	—	0.000
Capital Adequacy	7%	–	—	0.000
Consumer Protection	5%	–	—	0.000
Relevance and Adoption	5%	–	—	0.000

7.2. Risk Evaluation

Peg Stability	10%
Centralization	10%
Liquidity Depth	10%
Technical Security	10%
Regulatory Factors	8%
Counterparty/Custodial	7%
Governance	7%
Systemic Exposure	7%
Interoperability	7%
Operational Stability	7%
Capital Adequacy	7%
Consumer Protection	5%
Relevance and Adoption	5%

This set of 13 mutually exclusive categories, paired with an evaluation guideline, presents a structured and holistic approach for assessing the risk of a stablecoin asset.

$$C = \{1, 2, ..., 13\}$$

All category weights combine to total 100% of the evaluation, represented by a total risk rating between 0 and…

$$\sum_{i=1}^{13} w_i = 1.00$$

Category-specific weights can be adjusted to reflect institutional risk priorities.

Independent L / M / H ratings per category after evaluations.

$$R_i \in \{L, M, H\}$$

Each category risk rating level maps to a numeric coefficient:

$$\varphi(R_i) = \begin{cases} 0.10 & \text{Low Risk} \\ 0.50 & \text{Medium Risk} \\ 1.00 & \text{High Risk} \end{cases}$$

0.10	Peg Stability	10%
0.10	Centralization	10%
0.50	Liquidity Depth	10%
0.10	Technical Security	10%
0.10	Regulatory Factors	8%
0.50	Counterparty/Custodial	7%
0.50	Governance	7%
0.10	Systemic Exposure	7%
1.00	Interoperability	7%
0.10	Operational Stability	7%
0.10	Capital Adequacy	7%
0.50	Consumer Protection	5%
1.00	Relevance and Adoption	5%

Each categories weight is multiplied by its associated risk rating coefficient.

When summed, the result is a **Total Risk Rating (TRR)** where **TRR** is between **[0,1]**

Risk Coefficient x Category Weight

$\varphi(R_i)$	Category	w_i	
0.10	Peg Stability	10%	= **0.01**
0.10	Centralization	10%	= **0.01**
0.50	Liquidity Depth	10%	= **0.05**
0.10	Technical Security	10%	= **0.01**
0.10	Regulatory Factors	8%	= **0.008**
0.50	Counterparty/Custodial	7%	= **0.035**
0.50	Governance	7%	= **0.035**
0.10	Systemic Exposure	7%	= **0.007**
1.00	Interoperability	7%	= **0.07**
0.10	Operational Stability	7%	= **0.007**
0.10	Capital Adequacy	7%	= **0.007**
0.50	Consumer Protection	5%	= **0.025**
1.00	Relevance and Adoption	5%	= **0.05**

Lower TRR represents lower inherent risk.

Higher TRR signals compounding structural risk.

$$TRR = \sum_{i=1}^{13} w_i \cdot \varphi(R_i)$$

Moderate Risk = 0.324 TRR

$$TRR \in [0,1]$$

TRR Range	Risk Level	Tradfi Analogy
0.00 – 0.25	Low TRR	Sovereign Bonds / Cash
0.26 – 0.50	Moderate TRR	Equities
0.51 – 0.75	High TRR	Non-HQLA / Shadow Banking
0.76 – 1.00	Extreme TRR	Prohibited Assets

The following is an example of a mock completed Risk Evaluation on a stablecoin asset, with the TRR resulting in a 0.4 (slightly below a medium Rating). The TRR we calculate as the sum of all category weights times its evaluated Risk Levels H=1.00, M=0.50, L=0.10:

.10*0.10 + .10*.50 + .10*.50 + .10*1.00 + .08*.10 + .07*.50 + .07*.10 + .07*.50 + .07*1.00 + .07*.10 + .07*.10 + .05*.10 + .05*.50 = 0.409

Stablecoin Risk Evaluation Framework

Assessment Category	Category Weight	Risk Weight	Evaluation Details	Risk Rating
Peg Stability	10%	Low	Less than 1% peg swing in the past 2 years	**0.010**
Centralization	10%	Medium	30% distributed ownership tokens in 10 accounts	**0.050**
Liquidity Depth	10%	Medium	LCR of 86% and NSFR of 91%	**0.050**
Technical Security	10%	High	No smart contract audit performed	**0.100**
Regulatory Factors	8%	Low	Compliant with MICA and DORA	**0.008**
Counterparty/Custodial	7%	Medium	Some findings on key management of custodian.	**0.035**
Governance	7%	Low	Public board of large reputable firms.	**0.007**
Systemic Exposure	7%	Medium	Price oracle risks found	**0.035**
Interoperability	7%	High	Distributed tokens across 15 chains	**0.070**
Operational Stability	7%	Low	Majority permissioned chains centralized on AWS	**0.007**
Capital Adequacy	7%	Low	No risks found	**0.007**
Consumer Protection	5%	Low	Insured and publicly posted financial audit by Big 4 firm.	**0.005**
Relevance and Adoption	5%	Medium	Less than 2 years old, 15 developers on github	**0.025**

Standard impact vs likelihood risk levels:

High	Medium	Low

Where quantitative data is not readily available, qualitative proxies—such as mock audits, usability testing, or liquidity stress simulations can be used, such as Monte Carlo methods or others typically used in financial services and credit rating. While the criteria are designed to be applied independently, they also function collectively to provide a holistic picture of risk rating and performance stability. Stakeholders should tailor the application of each criterion to their specific context and maturity level, using available research, field data, and pilot testing to validate assumptions.

This matrix serves as both a benchmarking tool and a guide for continuous improvement, supporting the development of robust, scalable, and standards-aligned systems in blockchain and decentralized finance protocol.

8. Meta Classifications for Risk Aspects

The ratings classifications can be clustered into three meta-classifications of, financial, technical, and human related risk aspects. This, by design, allows a broad coverage of treatment scenarios to take into account a balanced analysis.

Finance Related Risk Aspects

- Peg Stability
- Centralization*
- Liquidity Depth
- Capital Adequacy

Technical Related Risk Aspects

- Operational Reliability
- Systemic Exposure
- Interoperability and Crosschain
- Custodial/Counterparty*
- Technical Security

Human-Related Risk Aspects

- Governance*
- Consumer Protection
- Relevance and Adoption
- Regulatory Factors

* Do note that some risk aspects can overlap into multiple meta-categories; such as “Governance” which may be Human related, or Technical related if a stablecoins protocol is driven by on-chain governance smart contracts.

8.1. Peg Stability

Peg Stability Rating

ASSESSMENT TYPE
Quantitative

EVALUATION METRIC
Deviation from target (<0.5% ideal)

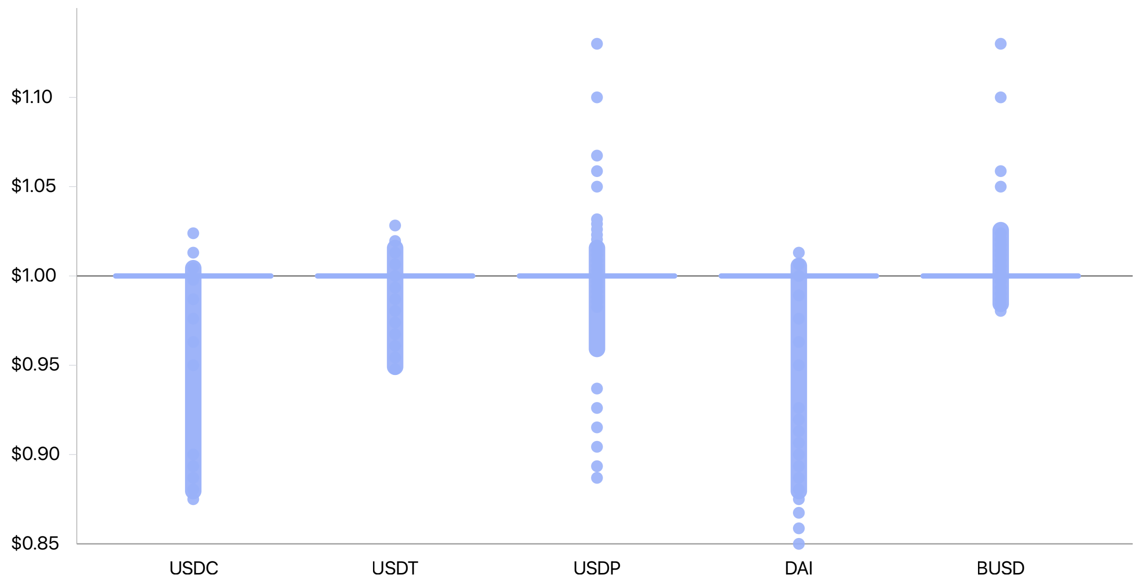
MEASUREMENT APPROACH
Measure via 365-day rolling volatility; depegs erode principal.

>=1.0% peg deviation
<1.0% and >=0.5% peg deviation
<0.5% peg deviation

Example Analysis

Example of a quantitative 12 -month observation period of five stablecoins analyzed using a box-plot framework to visually show the range of the price levels, facilitating a comparative assessment of peg stability and fluctuations.

Rolling 360 Day Historical Price of Different Stablecoins



As of June 15, 2023. Source: Lukka.

8.2. Centralization

Centralization Rating

// ASSESSMENT TYPE

Quantitative

// EVALUATION METRIC

Single-point failure in issuance, custody or governance of total supply.

// MEASUREMENT APPROACH

Assess ownership or issuer concentration of securities.

>=50% concentration
>=10% and <50% concentration
<10% concentration

Measuring the Centralization Risk of a Stablecoin

Using Digital Asset Concentration Ratio (DACR)

Calculating DACR

Calculate the Total Liquid Supply

$$S_{\text{liq}} = S_{\text{circ}} - S_{\text{locked}} - S_{\text{treasury}} - S_{\text{bridge}}$$

Calculate Top-N share of the liquid supply and effective holder base as reported onchain.

$$p_{N,\text{liq}} = \frac{\sum_{i=1}^{N} b_i}{S_{\text{liq}}}$$

Calculate DACR(N) adjusting for Top-N relative to effective total address base as seen onchain.

$$DACR_N = p_{N,\text{liq}} - \frac{N}{H_{\text{eff}}}$$

DACR Formula Coefficients

S_{liq}	Liquid circulating supply on the chain measured
S_{locked}	Provably locked/escrowed (vesting, timelocks)
S_{treasury}	Issuer/protocol treasury wallets (if not freely tradable)
S_{bridge}	Bridge custody contracts (if it's just backing/wrapping)
S_{mm}	Market maker / exchange hot wallets
N	Number of the top address/holders to consider
H_{eff}	Number of economically meaningful holder
N/H_{eff}	The share of addresses represented by the Top-N
$p_{N,\text{liq}}$	The share of liquid supply they control
$DACR_N$	Ratio of how many times more concentrated the asset is than in an "equal distribution" baseline.

Stablecoin Concentration Example

Practical Example of calculating centralization risk via asset concentration

Rolling 360 Day Historical Price of Different Stablecoins

Stablecoin	Mkt. Cap ($B, Mar 1)	Change in Mkt. Cap ($B, Mar 1–Apr 1)	No. Unique Holders on Ethereum (000s, Jul 26)	% Owned by Top 10 Addresses on Ethereum (Jul 26)	% Issued on Ethereum (Mar 1)
USDC	42	-9.7	1,750	16.47	~90
USDT	71	8.8	4,500	18.69	~45
BUSD	10.2	-2.6	170	**91.29**	100
DAI	5	0.1	495	28.07	100

In this table example the DACR calculates for BUSD = **0.9129 (Extreme Risk)**

>=50% concentration

How to interpret this

Equal Distribution Baseline = ~0.006%

Actual concentration: ~91.29%

Premium above baseline: ~91.28%

This tells us that the top-10 addresses control ~91% more BUSD asset supply than they would under a neutral, evenly distributed holder base.

Top-10 share of supply

$p_{10} = 91.29\% = 0.9129$

Number of holders on Ethereum

$H = 170{,}000$

Top-N addresses

$N = 10$

Equal-distribution baseline

$$\frac{N}{H} = \frac{10}{170{,}000} = 0.00005882$$

$$\mathrm{DACR}_{10}(\mathrm{BUSD}) = 0.9129 - 0.00005882 = 0.91284118$$

8.3. Liquidity Depth

ASSESSMENT TYPE
Quantitative

EVALUATION METRIC
Liquidity ratios to ensure the stablecoin can withstand periods of financial stress without impacting redemption speed and market depth.

LCR and NSFR <80% **>1 day redemption speed.**
LCR and NSFR >=80% and <90% **<1 day redemption speed.**
LCR and NSFR >=90% **Near instant redemption.**

MEASUREMENT APPROACH
Measure the capability to redeem or convert tokenized security for underlying collateral. and the amount available for redemption at any given time and any amount required for existing transaction volume.

Liquidity ratios ensure a stablecoin can withstand periods of financial stress without impacting redemption and/or market depth. This is especially true for fully collateralized stablecoins, where redemption would have risk through operational/technical failure categories only, rather than financial.

Liquidity Coverage Ratio (LCR)

This ratio requires a stablecoin to be collateralized with enough high-quality liquid assets (HQLA) that can be easily converted to fiat to cover its net cash outflows during a stress scenario.

LCR Basel III Mapping

Rationale	HQLA Classification	Basel Analog
Treated as cash-equivalent	Level 1 HQLA-Equivalent	Cash / Central Bank Reserves
Liquidity + governance risk	Level 2A-Equivalent	Sovereign bonds
Redemption + peg fragility	Level 2B-Equivalent	Corporate bonds / equities
No liquidity recognition	Non-HQLA	RMBS / shadow assets
Asset excluded	Ineligible	Structured / prohibited

Net Stable Funding Ratio (NSFR)

$$NSFR = \frac{\text{Available Stable Funding (ASF)}}{\text{Required Stable Funding (RSF)}} \geq 100\%$$

Designed for longer-term resilience, the NSFR requires stable assets to fund their activities with a sufficient amount of stable funding over a one-year period of extended stress.

Where:

- ASF measures funding reliability over a 1-year horizon.
- RSF reflects the liquidity risk of assets over the same horizon.

RSF/NSFR Basel III Mapping

TRR Band	RSF Weight	Basel Analog
0.00–0.25	0%–5%	Cash / central bank reserves
0.26–0.40	10%	Level 1 sovereigns
0.41–0.50	25%	High-quality corporate bonds
0.51–0.75	50%–85%	Illiquid financial assets
0.76–1.00	100%	Non-performing / ineligible assets

Time Horizons Analog to TradFi Assets

Liquidity Horizon	Interpretation
T+0 to T+1	Cash-like, immediate conversion
3–7 days	Sovereign-like liquidation
10–30 days	Market-dependent exit
30–90 days	Distressed liquidity
>90 days / none	Liquidity failure

8.4. Capital Adequacy

CAR >=10%
CAR <10% and >=6%
CAR <6%

ASSESSMENT TYPE

Quantitative

EVALUATION METRIC

Basel-like ratios are a set of standardized financial metrics, such as the Capital Adequacy Ratio (CAR) and Leverage Ratio, that measure a stablecoin's ability to absorb losses. which creates guidelines for capital, liquidity, and funding.

MEASUREMENT APPROACH

The CAR is the most fundamental Basel ratio, and it ensures that banks hold enough capital to cover potential losses.

$$CAR = \frac{(\text{Tier 1 Capital} + \text{Tier 2 Capital})}{\text{Risk-Weighted Assets}}$$

TIER 1 CAPITAL

Composed of high-quality capital like US Treasuries or collateralized fiat. It is the most loss-absorbing. Tier 1 capital must be at least 6% of its risk-weighted assets (RWA).

TIER 2 CAPITAL

Consists of supplementary capital, such as revaluation reserves and subordinated debt, which is less liquid and offers a lower degree of protection. Algorithmic peg stability may be considered Tier 2.

RISK-WEIGHTED ASSETS (RWA)

Assets such as loans and investments, are assigned a risk percentage, with safer assets like government debt receiving a lower risk weight than high-risk assets like unsecured personal loans. The total RWA reflects the stablecoins overall risk profile.

Note: Basel III requires a minimum CAR of 8%, though national regulators may require more.

8.5. Technical Security

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Cyber security related exposure, technical vulnerabilities, code/protocol composability and integration factors.

MEASUREMENT APPROACH
Review the Smart contract audit findings, length of time since list code audit from production implementation, and complexity factors with onchain integration vulnerabilities.

No smart contract audit or unresolved vulnerabilities in code.
Code audits performed, but don't include Incremental code updates.
Continuously audited smart contract code performed by third party researchers. All vulnerabilities addressed.

Stablecoins are typically codified smart contracts that operate onchain, and are intended to be Turing complete, or self-executing. When code is not reviewed, audited, or goes through the deep security analysis and review that is required prior to onchain deployment, this can lead to a multitude of technical security issues. The risk profile is completely different than traditional finance assets due to the fact that the money is actually the code, and is considered programmable finance.

Qualitative measurement approaches can start with simply accessing, requesting, or reviewing an smart contract audits by the issuer or a third party assessor.

Simple risk ratings can be applied to:

- if there has been a third party audit conducted
- if all vulnerabilities have been remediated
- the continuous audit integration on subsequent updates to contract logic
- the complexity of the stablecoins integration on external factors within the onchain ecosystem (i.e. composability)

Examples of Technical Security Issues

- Smart Contract Exploit
- Bridge Take-Over
- Redemption Freeze
- Synthetic Hedge Regime Break
- DeFi-Based Liquidation
- Malicious Governance
- Chain Halt / Liveness Failure
- Weak Entropy
- Layer-1 Security Exploit
- Cryptographic Weakness
- Flash Loan Exploit
- Sandwich Attack
- MEV Exploit
- Delegate Call Exploit
- Bad Contract Initialization

8.6. Interoperability and Crosschain

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Exposure level to potential cross-chain issues or failures.

MEASUREMENT APPROACH
Analysis of the complexity and reliance level of the stablecoin has on cross-chain operations and integrations. Bridges, multi-chain, CCTP, Layer-1 to Layer-2, wrapped assets, staked assets, and other technical methods in that the stablecoin create increasing levels of risk, and exposure from security incidents, and asset redemption/efficiency.

Multi-chain asset with complex bridge logic. Assets rely on vaults, oracles, and several disparate system protocols and incompatible Layer-1 ecosystems.
Cross-chain asset with compatible smart contract languages and with some reliance and integration with external protocols, such as oracles.
Single chain asset with no external reliance on other protocols.

8.7. Operational Stability

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Likelihood of a potential system-wide infrastructure or host/platform incident due to critical failures or cascading events that impact the stability and availability of the asset.

MEASUREMENT APPROACH
Analysis of the infrastructure that the stablecoin is hosted upon, and assessing the likelihood of an occurence of a system failure, outage. or a dependency on which the asset relies that may fail, causing service denial and loss of ability for redemption or trade.

Stablecoin is hosted on un-tested or unproven infrastructure. Asset has a dependency on vulnerable supply chain items to function.
Stablecoin is hosted on non-standard, but tested infrastructure. Trivial complexity of environmental dependencies.
Stablecoin hosted on tested and stable/ proven infrastructure. Contingencies in place for system interruption. No dependencies.

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8.8. Regulatory Factors

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Compliance with regulatory mandates (such as MiCA/DORA/GENIUS/Clarity), and level of jurisdictional regulatory maturity and stance.

MEASUREMENT APPROACH
Review or request regulator approval evidence in the relevant jurisdictions the stablecoin asset is required to be compliant.

Non-compliance in applicable jurisdictions.
Unclear regulatory clarity in some or all applicable jurisdictions.
Fully compliant.

8.9. Counterparty/Custodial

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Default risk of reserve holders, custodial security factors around stablecoin administrative functions or ownership, and insurance level of reserves in custody.

MEASUREMENT APPROACH
Review or request evidence of custodial security processes, countermeasures, and safeguards in key management. Level of insurance of stablecoin reserves held in custody.

No third party custody attestation report, or unresolved findings in custodial audits. No insurance.
Incomplete or > 1 year since third party custodial assessment. Insured reserves, but not full coverage.
No issues in third party custodial assessment. Fully insured reserves.

8.10. Governance

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Transparency level, and inherent risk surrounding the decision making processes for management, updates, or administration of assets.

MEASUREMENT APPROACH
If asset has decentralized governance, such as a DAO, assess the amount of inefficiencies or level of conflict, as well as vote distribution within protocol. Otherwise, assess risks in the processes, update procedures, and previous administrative behaviors around the management, and members, committees, boards, authorities involved.

Anonymous entities hold majority vote or governance authority. Existing or previous governance conflicts, or total lack of fudiciary participation.
Some accountable entities authorized and identified to facilitate governance. Documented governance policy, but limited reference or history.
Full KYC of entities /individuals accountable and responsible for governance. No previous issues or conflicts in administrative due process.

8.11. Systemic Exposure

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Likelihood of a potential onchain economic or protocol specific incident that impacts the peg stability of the asset, or ability to send transactions.

MEASUREMENT APPROACH
Analysis of the Layer 1/Layer 2 platform the stablecoin is hosted upon, and assessing the likelihood of an occurence of a total system consensus failure, or a dependency on the asset that may fail, causing breakdown in the peg, or availability of redemption.

Stablecoin contract/program is hosted on un-tested or unproven Layer1 DLT. Dependency on other vulnerable protocols to function.
Stablecoin is hosted on non-standard, but tested DLT infrastructure. Trivial complexity of environmental dependencies.
Stablecoin hosted on EVM or other proven DLT infrastructure. Contingencies in place for system interruption. No dependencies.

8.12. Consumer Protection

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Trustworthiness and transparency of governance, financials, reserves, and responsible/accountable parties.

MEASUREMENT APPROACH
Results of third party audited financials, due diligence on the reputation and trustworthiness of the stablecoin developers/issuers/board.

Poor transparency may signal a higher risk of fraud, or inaccurate details.

Lack of third party diligence, audit results, and no transparency regarding reserves, mitigations, developers, and other information.
Some level of transparency reported from independent audits, but may have several areas that need improvement.
High level of transparency. Excellent reputation.

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8.13. Relevance and Adoption

ASSESSMENT TYPE
Qualitative

EVALUATION METRIC
Long term support, maintenance, and mass-adoption of the stablecoin by general public, and large financial institutions. High level of organic transaction volume should be reviewed.

MEASUREMENT APPROACH
Review the amount of natural transaction volume that occurs utilizing the stablecoin, and the amount of exchanges/businesses that support it as a payment method. The project has a large community of developers, supporting businesses, and has a strategic roadmap that builds confidence in the relevance for long term use and adoption.

<$10M daily transaction volume. Limited or no support and use by businesses and consumers. In-Progress or In-Dev Roadmap.
>=$10M and < $100M daily transaction volume. Growing support and use by businesses and consumers.
>= $100M daily transaction volume Widespread support, and use by businesses and consumers. Long term strategic vision.

9. Conclusion

Stablecoins are evolving into critical components of digital financial infrastructure, supporting payments, settlement, decentralized finance, and emerging institutional use cases. Despite their intended price stability, stablecoins exhibit materially different risk profiles depending on their reserve composition, governance structures, technical architecture, regulatory posture, and market adoption. Price stability alone does not adequately reflect these underlying risks.

The Stablecoin Risk Framework provides a structured methodology for evaluating these dimensions in a consistent and transparent manner. By assessing stablecoins across thirteen weighted categories spanning financial resilience, technical security, governance quality, and market dynamics, the framework produces a normalized Total Risk Rating (TRR) that enables meaningful comparison between assets. The approach is designed to combine quantitative data sources—such as on-chain metrics, liquidity indicators, and reserve disclosures—with expert analysis of governance, regulatory positioning, and operational design.

The framework is intended to support multiple use cases, including institutional due diligence, issuer transparency, portfolio risk management, and ongoing monitoring of stablecoin exposures. Assessments are designed to be evidence-based and auditable, allowing organizations to understand not only the resulting risk score but also the underlying drivers that contribute to it.

Importantly, the framework is designed to evolve alongside the rapidly developing stablecoin ecosystem. As disclosure standards improve, regulatory regimes mature, and new stablecoin designs emerge, the methodology can incorporate additional data sources and refinements while maintaining comparability across historical assessments.

By providing a clear and systematic approach to evaluating stablecoin risk, the framework aims to support safer adoption of digital assets and enable institutions to make informed decisions about the stablecoins they rely upon for financial operations.

10. Terminology

Definitions and terms used in stablecoins and/or decentralized finance that is unique to this asset sector.

Mint

The process of creating or issuing new units of a stablecoin or cryptocurrency, typically backed by a reserve asset or protocol mechanism, to increase the circulating supply in response to demand or to maintain peg stability.

Burn

The deliberate act of permanently removing units of a stablecoin or cryptocurrency from circulation by sending them to an inaccessible address or nullifying them, often to reduce supply and stabilize value or maintain a peg.

Peg

The fixed exchange rate at which a stablecoin is tied to an underlying asset, such as a fiat currency (e.g., USD), commodity, or another cryptocurrency, to ensure price stability.

Collateral

Assets, such as fiat currency, cryptocurrencies, or other financial instruments, pledged to back the value of a stablecoin, ensuring its stability and redeemability.

Decentralized Finance (DeFi)

A financial ecosystem built on blockchain technology that enables peer-to-peer financial services, such as lending, borrowing, and trading, without reliance on traditional centralized intermediaries.

Smart Contract

Self-executing, programmable agreements deployed on a blockchain, with predefined rules and conditions that automatically facilitate, verify, or enforce transactions in DeFi and stablecoin protocols.

Liquidity Pool

A collection of funds locked in a smart contract, used to facilitate trading, lending, or other DeFi activities by providing liquidity for decentralized exchanges or protocols.

Decentralized Exchange (DEX)

A blockchain-based platform that enables direct peer-to-peer trading of cryptocurrencies without intermediaries, often integrated with DeFi protocols.

Yield Farming

The practice of staking or lending assets in DeFi protocols to earn rewards, typically in the form of additional tokens, to maximize returns on capital.

Total Value Locked (TVL)

The aggregate value of assets staked, locked, or deposited in a DeFi protocol, serving as a metric to gauge its size, adoption, and activity.

Algorithmic Stablecoin

A stablecoin that maintains its peg through algorithmic mechanisms, such as adjusting supply based on market conditions, rather than relying solely on collateral reserves.

Reserve

The pool of assets, such as fiat or cryptocurrencies, held to back the value of a stablecoin, ensuring its redeemability and maintaining confidence in its peg.

Slippage

The difference between the expected price of a trade and the actual executed price, often occurring in DeFi due to low liquidity or high volatility in trading pools.

Governance Token

A cryptocurrency token that grants holders the ability to vote on decisions affecting a DeFi protocol or stablecoin system, such as protocol upgrades or parameter adjustments.

Oracle: A third-party service or protocol that provides external data (e.g., price feeds) to smart contracts on a blockchain, enabling DeFi and stablecoin systems to interact with real-world information.

Impermanent Loss

The potential loss experienced by liquidity providers in AMM-based DeFi protocols when the price of pooled assets diverges, reducing the value of their staked assets compared to holding them outside the pool.

Flash Loan

An uncollateralized loan in DeFi that is borrowed and repaid within a single blockchain transaction, often used for arbitrage or other short-term financial strategies.

LCR: Liquidity Coverage Ratio

HQLA: High Quality Liquid Assets

VaR: Value at Risk

NSFR: Net Stable Funding Ratio