

Lesson 22: Stablecoins and Terra/Luna Case Study

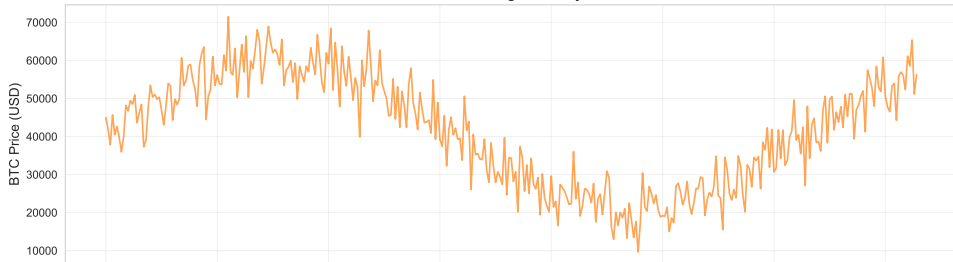
Module 2: Blockchain Fundamentals

Digital Finance

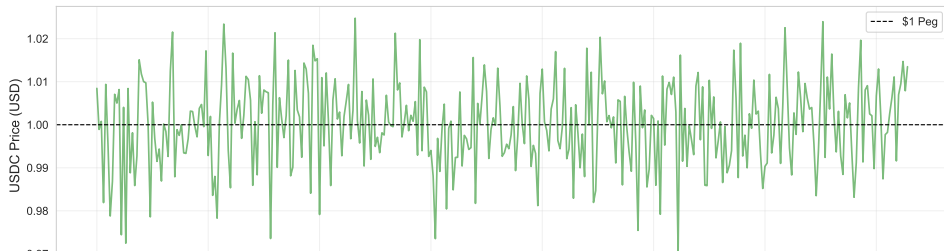
The Volatility Problem

Volatility Problem: Why Stablecoins?

Bitcoin: High Volatility



USDC Stablecoin: Stable Value



What is a Stablecoin?

Definition:

- Cryptocurrency designed to maintain stable value
- Typically pegged 1:1 to fiat (USD, EUR)
- Combines crypto benefits with price stability

Use Cases:

- Medium of exchange
- Store of value (short-term)
- DeFi collateral
- Trading pairs (BTC/USDT)
- Remittances

`charts/lesson_22/stablecoin_use_cases.pdf`

`charts/lesson_22/stablecoin_types.pdf`

Fiat-Collateralized: Tether (USDT)

Mechanism:

- 1 USDT = \$1 in bank reserves
- Custodian holds fiat
- Users trust issuer's solvency
- Mint: Deposit \$1 → receive 1 USDT
- Redeem: Burn 1 USDT → receive \$1

Challenges:

- Centralization (single point of failure)
- Audit transparency (Tether controversy)
- Regulatory compliance

[charts/lesson_22/fiat_collateralized_flow.pdf](#)

Tether Controversy: Are Reserves Real?

Claims:

- Tether claims 1:1 backing since 2014
- Market cap: \$100B+ (2024)

Controversies:

- Lack of audits (only attestations, not full audits)
- NYAG investigation (2021): Admitted reserves not fully in cash (commercial paper, crypto)
- \$41M settlement, barred from New York trading
- 2024 breakdown: ~85% T-bills, ~10% repo, ~5% other

Risk: Bank run scenario – if everyone redeems simultaneously, can Tether honor?

USDC: Regulated Alternative

Circle (issuer):

- US-based, regulated
- Monthly audits (Grant Thornton)
- 100% reserves (cash + short-term Treasuries)
- Transparency dashboard

Advantages:

- Higher trust (full audits)
- Institutional adoption
- Regulatory clarity

charts/lesson_22/usdc_reserves.pdf

[charts/lesson_22/dai_mechanism.pdf](#)

Peg Maintenance:

- **DAI < \$1:** Raise stability fee (reduce supply)
- **DAI > \$1:** Lower stability fee (increase supply)
- **DAI Savings Rate (DSR):** Interest for holding DAI

Collateral Types:

- ETH (primary)
- WBTC, USDC (centralized, controversy)
- Real-world assets (RWA)

[charts/lesson_22/dai_peg_history.pdf](#)

Algorithmic Stablecoins: The Dream

Vision:

- No collateral required
- Pure algorithmic supply/demand
- Fully decentralized
- Scalable without capital lock-up

Mechanisms:

- Rebate (Ampleforth): Change token supply
- Seigniorage (Basis, Empty Set): Issue/burn shares
- Dual-token (Terra/Luna): Arbitrage mechanism

[charts/lesson_22/algorithmic_concept.pdf](#)

Reality: All pure algorithmic stablecoins have failed (Basis, Jan, Terra)

Terra/Luna: The \$60 Billion Collapse

[charts/lesson_22/terra_ecosystem.pdf](#)

Design:

- 1 UST always redeemable for \$1 worth of LUNA (protocol guarantee)
- Arbitrageurs maintain peg through minting/burning

Case 1: $UST < \$1$ (e.g., \$0.98)

- 1 Buy 1 UST for \$0.98
- 2 Burn 1 UST \rightarrow mint \$1 of LUNA
- 3 Sell LUNA for \$1
- 4 Profit: \$0.02 per UST (reduces UST supply, restores peg)

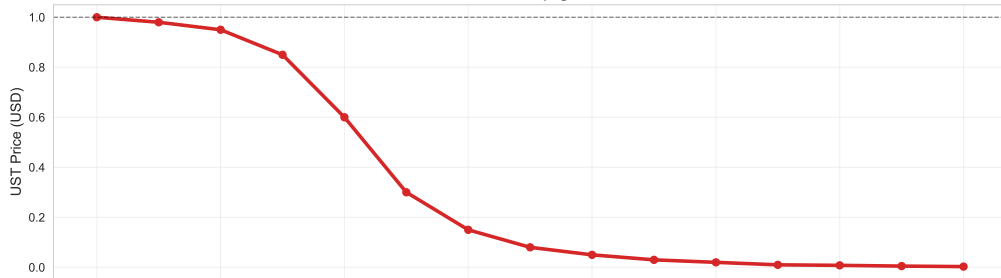
Case 2: $UST > \$1$ (e.g., \$1.02)

- 1 Burn \$1 of LUNA \rightarrow mint 1 UST
- 2 Sell 1 UST for \$1.02
- 3 Profit: \$0.02 (increases UST supply, lowers price)

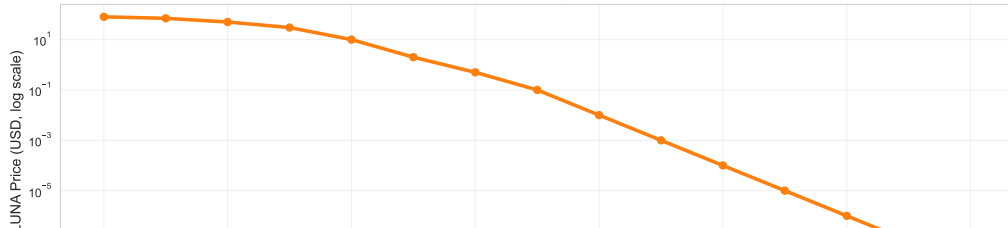
The Death Spiral: May 2022

Terra/Luna Death Spiral (May 7-20, 2022)

UST Depeg



LUNA Collapse



Why Did Terra Collapse?

Structural Flaws:

- **Ponzi Dynamics:** Anchor's 20% APY funded by LUNA inflation (unsustainable)
- **Circular Dependency:** UST backed by LUNA, LUNA value derived from UST demand
- **No External Collateral:** Pure faith-based system
- **Bank Run Vulnerability:** Confidence loss → redemptions → LUNA dilution → further confidence loss

Trigger:

- \$2B UST withdrawn from Anchor (possibly coordinated attack)
- Luna Foundation Guard's \$3B BTC reserves insufficient to defend peg

Aftermath: \$60B market cap evaporated, lawsuits, Do Kwon (founder) arrested in Montenegro

Direct Victims:

- Retail investors lost life savings
- South Korean adoption was high
- Pension funds, institutions exposed

Broader Contagion:

- 3AC (Three Arrows Capital) hedge fund collapse (LUNA exposure)
- Celsius, Voyager bankruptcies (domino effect)
- Crypto market crash (2022 bear market)

`charts/lesson_22/contagion_map.pdf`

- ❶ **No Free Lunch:** 20% risk-free yield is impossible sustainably
- ❷ **Algorithmic Stablecoins are Fragile:** Require continuous growth, vulnerable to bank runs
- ❸ **Circular Dependencies are Dangerous:** UST value depended on LUNA, LUNA on UST
- ❹ **Reserves Matter:** \$3B BTC reserves inadequate for \$18B stablecoin
- ❺ **Regulation Incoming:** Failures like Terra accelerate regulatory scrutiny
- ❻ **Hubris Warning:** Do Kwon's overconfidence ("I don't debate the poor") ignored critics

Quote: "If UST depegs, I will personally absorb the loss." – Do Kwon (didn't happen)

Regulatory Push:

- US: Stablecoin legislation proposed (reserve requirements, audits)
- EU: MiCA regulation includes stablecoin provisions
- South Korea: Investigated Terra Foundation

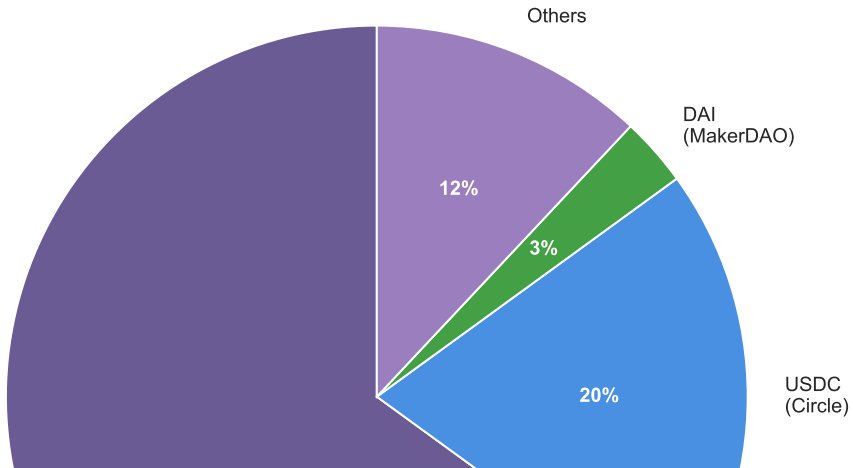
Market Shift:

- Flight to regulated stablecoins (USDC, USDT)
- Algorithmic stablecoins lost trust (FEI, FRAX pivoted to collateralized)
- Increased scrutiny on DeFi yields

Innovation:

- Frax: Hybrid model (partial collateral + algorithmic)
- GHO (Aave): Over-collateralized, DAO-governed
- LUSD (Liquity): Immutable, minimum 110% collateral

Stablecoin Market Share (2024)



Central Bank Digital Currencies (CBDCs)

Concept:

- Government-issued digital currency
- Not a stablecoin (is the fiat itself)
- Centralized control
- Programmable money

Examples:

- China: e-CNY (digital yuan)
- Bahamas: Sand Dollar (launched 2020)
- EU: Digital euro (pilot phase)
- US: Digital dollar (research)

[charts/lesson_22/cbdc_vs_stablecoin.pdf](#)

- **Stablecoins:** Crypto with stable value, essential for DeFi and payments
- **Fiat-Collateralized:** USDT/USDC, centralized, require trust in custodian
- **Crypto-Collateralized:** DAI, over-collateralized, decentralized but capital-inefficient
- **Algorithmic:** Terra/Luna, no collateral, death spiral vulnerability
- **Terra Collapse:** \$60B lost, Ponzi dynamics (Anchor 20%), circular dependency
- **Lessons:** Unsustainable yields, importance of real reserves, regulatory response

Next Lesson: Security and hacks – reentrancy, bridge exploits, best practices