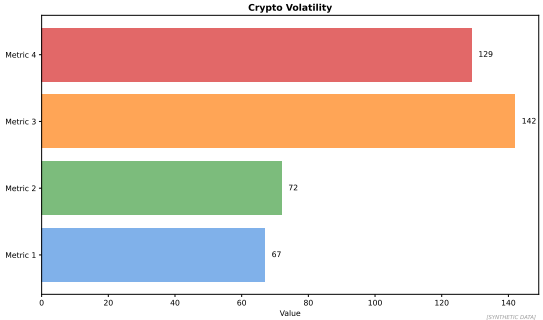
Lesson 22: Stablecoins and Terra/Luna Case Study

Module 2: Blockchain Fundamentals

Digital Finance

The Volatility Problem



Challenge:

- BTC, ETH too volatile for everyday transactions
- Cannot price goods, pay salaries, or lend in volatile assets
- Need stable unit of account

Solution: Stablecoins – cryptocurrencies pegged to stable assets (typically USD)

Key concepts from this slide inform practical applications in finance.

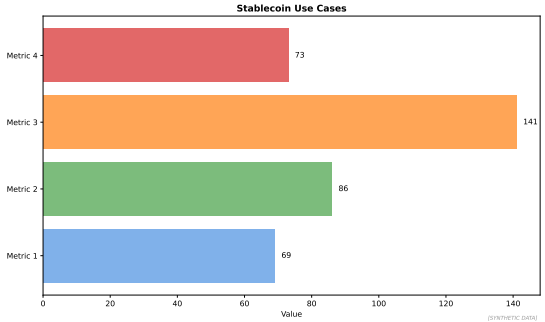
What is a Stablecoin?

Definition:

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

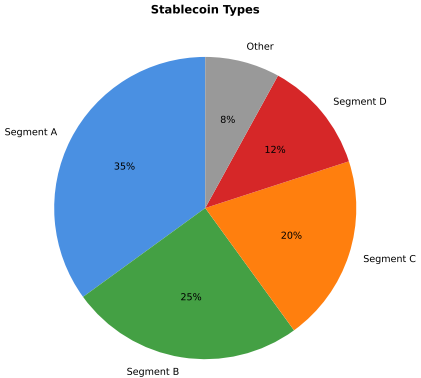
Use Cases:

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



Clear definitions are essential for understanding complex technical concepts.

Stablecoin Taxonomy



[SYNTHETIC DATA]

Three Main Types:

1. **Fiat-Collateralized:** Backed by USD reserves (USDT, USDC)
2. **Crypto-Collateralized:** Over-collateralized with crypto (DAI)
3. **Algorithmic:** No collateral, algorithmic supply adjustment (UST – failed)

Stablecoins bridge traditional and crypto finance by maintaining price stability.

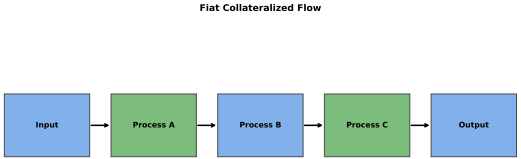
Fiat-Collateralized: Tether (USDT)

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



Key concepts from this slide inform practical applications in finance.

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?

Key concepts from this slide inform practical applications in finance.

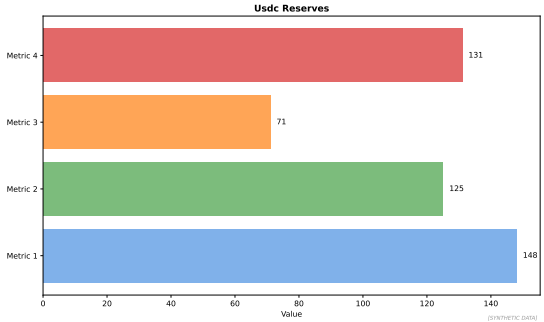
USDC: Regulated Alternative

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



2023 SVB Crisis: $3.3B stuck in Silicon Valley Bank (depegged to $0.87 briefly, recovered)

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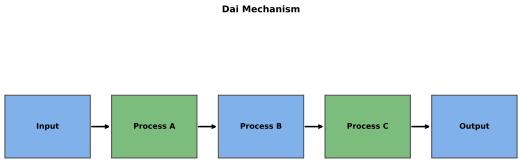
Crypto-Collateralized: DAI (MakerDAO)



Mechanism:

1. Deposit ETH (or other crypto) into Maker vault
2. Mint DAI (over-collateralized, e.g., 150% ratio)
3. If collateral drops below threshold, liquidated
4. To reclaim collateral, repay DAI + stability fee (interest)

Decentralization: No single custodian, governed by MKR token holders

Cryptographic primitives provide the security foundation for blockchain systems.

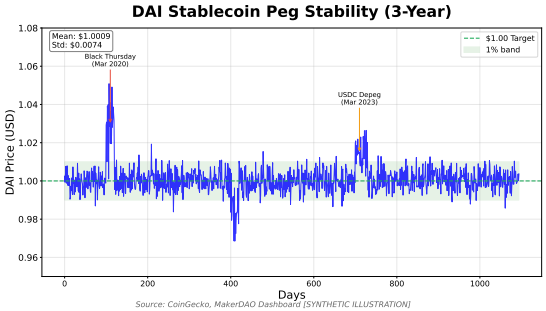
DAI Stability Mechanisms

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)



AI and ML are transforming financial services through automation and prediction.

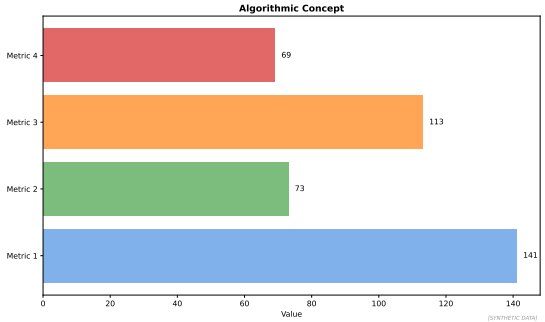
Algorithmic Stablecoins: The Dream

Vision:

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

Mechanisms:

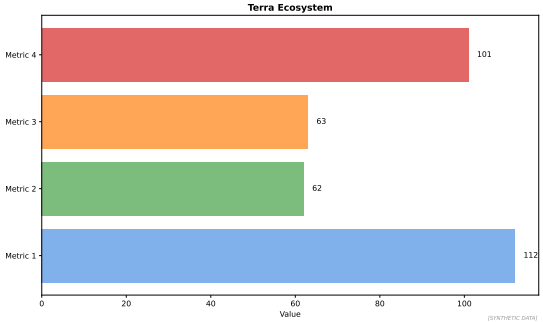
- Rebase (Ampleforth): Change token supply
- Seigniorage (Basis, Empty Set): Issue/burn shares
- Dual-token (Terra/Luna): Arbitrage mechanism



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

Stablecoins bridge traditional and crypto finance by maintaining price stability.

Terra/Luna: The $60 Billion Collapse



Ecosystem (Pre-Collapse):

- **UST:** Algorithmic stablecoin (target $1)
- **LUNA:** Volatile token, absorbs UST volatility
- **Anchor Protocol:** 20% APY on UST deposits (unsustainable)
- **Market Cap (May 2022):** UST $18B, LUNA $40B

Key concepts from this slide inform practical applications in finance.

Terra/Luna Mechanism: Arbitrage Peg

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)

Key concepts from this slide inform practical applications in finance.

The Death Spiral: May 2022

Timeline:

- **May 7:** Large UST withdrawals from Anchor, slight depeg to $0.98
- **May 8–9:** Panic selling, UST drops to $0.60, LUNA minted to absorb
- **May 10–11:** Hyperinflation of LUNA (supply: 350M $\rightarrow$ 6.5T), price collapses
- **May 12:** UST at $0.10, LUNA near $0, blockchain halted

Key concepts from this slide inform practical applications in finance.

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 $\rightarrow$ redemptions $\rightarrow$ LUNA dilution $\rightarrow$ 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

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Key concepts from this slide inform practical applications in finance.

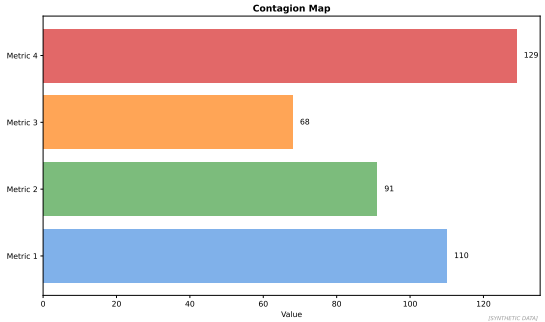
Terra Collapse: Contagion Effects

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)



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Lessons from Terra/Luna

1. **No Free Lunch:** 20% risk-free yield is impossible sustainably
2. **Algorithmic Stablecoins are Fragile:** Require continuous growth, vulnerable to bank runs
3. **Circular Dependencies are Dangerous:** UST value depended on LUNA, LUNA on UST
4. **Reserves Matter:** $3B BTC reserves inadequate for $18B stablecoin
5. **Regulation Incoming:** Failures like Terra accelerate regulatory scrutiny
6. **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)

Key concepts from this slide inform practical applications in finance.

Post-Terra: Industry Response

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

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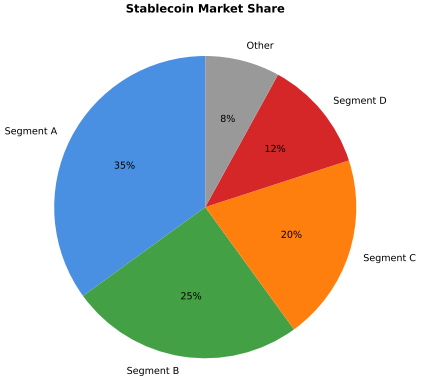
Stablecoin Market Share (2024)



[SYNTHETIC DATA]

Top Stablecoins:

- **USDT (Tether):** $100B+ (65%)
- **USDC (Circle):** $30B+ (20%)
- **DAI (MakerDAO):** $5B (3%)
- **Others:** BUSD (deprecated), TUSD, FRAX, USDD

Stablecoins bridge traditional and crypto finance by maintaining price stability.

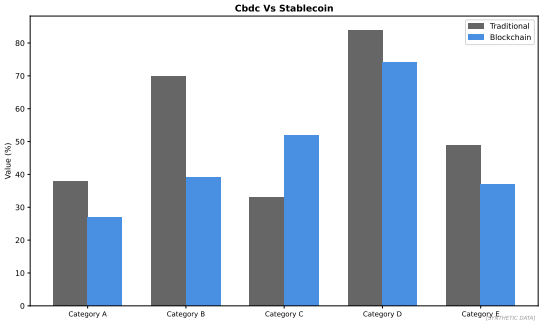
Central Bank Digital Currencies (CBDCs)

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)



Concern: Surveillance, programmable restrictions (e.g., expiry dates on money)

Banks play a central role in the financial system as intermediaries.

Summary

- **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