L39: Case Study - Terra/Luna Collapse

Module E: DeFi Ecosystem

Blockchain & Cryptocurrency

December 2025

Learning Objectives

- Understand the Terra/Luna mechanism (UST stablecoin + LUNA token)
- Analyze the Anchor Protocol's 20% APY promise
- Trace the death spiral timeline (May 2022)
- Identify systemic risks and warning signs
- Extract lessons for DeFi stability and sustainability

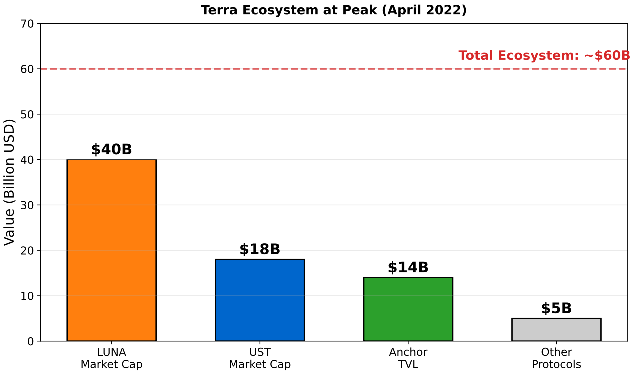
Terra Ecosystem Overview

Key Components:

- **UST (TerraUSD):** Algorithmic stablecoin pegged to $1
- **LUNA:** Native token of Terra blockchain, used to stabilize UST
- **Anchor Protocol:** Lending platform offering 20% APY on UST deposits

Creator: Do Kwon (Terraform Labs)
Peak Market Cap (April 2022): UST: $18B, LUNA: $40B
Collapse (May 2022): Both went to near-zero in 72 hours.

Terra Ecosystem at Peak



Combined $60B ecosystem collapsed in just 72 hours in May 2022

The UST-LUNA Mechanism

Algorithmic Stability: UST maintains $1 peg through arbitrage with LUNA.

Mechanism:

1. **Mint UST:** Burn $1 of LUNA, mint 1 UST
2. **Burn UST:** Burn 1 UST, mint $1 of LUNA

If UST ¿ $1: Burn LUNA → mint UST → sell UST → profit
If UST ¡ $1: Buy UST → burn UST → mint LUNA → profit

Problem: Only works if LUNA maintains value!

The Fatal Flaw: Death Spiral

Death Spiral Logic:

1. UST depegs below $1 (e.g., $0.90)
2. Arbitrageurs burn UST, mint LUNA
3. Massive LUNA supply increase (dilution)
4. LUNA price crashes
5. Confidence in UST collapses
6. More UST selling, deeper depeg
7. Cycle repeats, accelerating downward

Analogy: Like a central bank defending currency by printing more currency.
Critical Insight: Pure algorithmic stablecoins have no demand floor.

Anchor Protocol: The 20% APY Trap

Promise: Earn 20% APY by depositing UST.

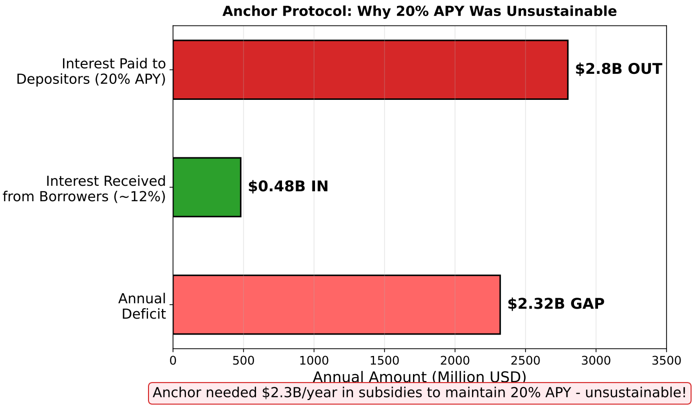
How It Worked:

- Users deposit UST into Anchor
- Anchor lends UST to borrowers (collateralized by staked LUNA)
- Borrowers pay interest (10-15%)
- **Gap:** Anchor subsidized difference to reach 20%

Red Flags:

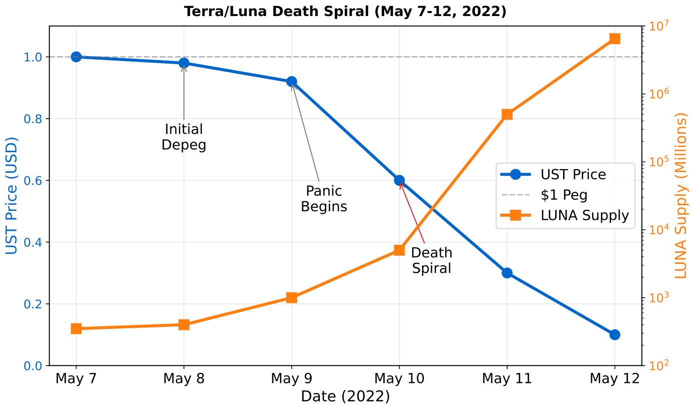
- Yield reserve burning $50-100M per month
- Projected to run out by mid-2022

Why 20% APY Was Unsustainable



Anchor was a Ponzi-like scheme: new deposits paid old depositors

The Death Spiral (May 7-12, 2022)



As UST depegged, LUNA supply exploded from 350M to 6.5 trillion tokens

Timeline: The Collapse

May 7-8: Initial Depeg

- Large UST withdrawals from Anchor ($2B+ in 48 hours)
- UST briefly drops to $0.98

May 9: Panic Begins

- UST falls to $0.92, LUNA drops 30%

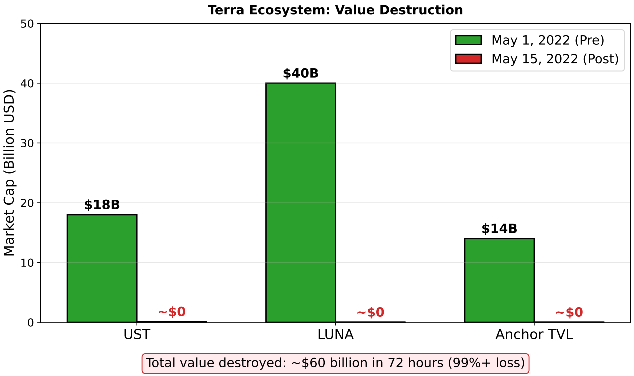
May 10: Death Spiral Accelerates

- UST at $0.60, LUNA collapses from $60 to $1

May 11-12: Total Collapse

- UST at $0.01, LUNA at $0.0001
- Terra blockchain halted

Value Destruction



Estimated $40B+ in investor losses; triggered broader crypto contagion

Bitcoin Reserve: Failed Rescue

Luna Foundation Guard (LFG):

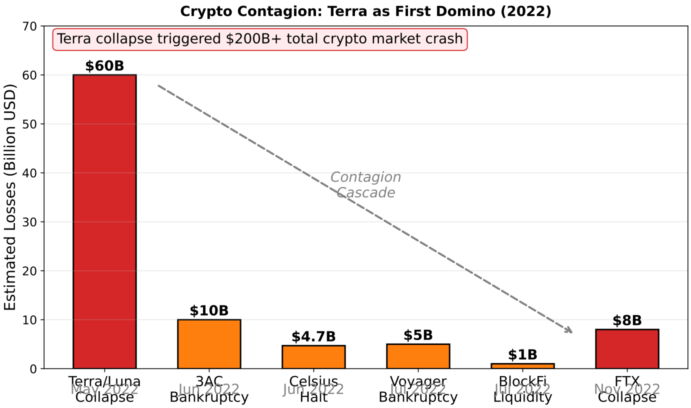
- Reserve fund with \$3B+ in Bitcoin, AVAX
- Plan: If UST depegs, sell BTC to buy UST

Reality (May 2022):

- LFG deployed \$1.5B BTC to buy UST
- Ineffective: Death spiral too fast
- Lost most of the BTC (sold near bottom)

Lesson: Finite reserves cannot defend algorithmic peg under mass panic.

Contagion: First Domino



Terra collapse caused 3AC bankruptcy, which triggered Celsius/Voyager failures

Three Arrows Capital (3AC) Contagion

Connection:

- 3AC was major LUNA investor (billions in exposure)

Cascade:

1. LUNA collapses (May 2022)
2. 3AC's collateral becomes worthless
3. 3AC fails margin calls on other loans
4. Lenders (BlockFi, Celsius, Voyager) take massive losses
5. 3AC declares bankruptcy (July 2022)

Lesson: Interconnected leverage amplifies failures.

Do Kwon's Hubris

Quotes (Pre-Collapse):

- "I don't debate the poor." (Twitter, responding to critics)
- "95% of stablecoins will fail, UST will win."

Behavior:

- Dismissed warnings from economists, DeFi experts
- Promised unrealistic yields (20% Anchor)

Legal Aftermath:

- SEC charged Do Kwon with fraud (2023)
- Arrested in Montenegro (March 2023)
- Facing extradition to US or South Korea

Warning Signs (In Hindsight)

Red Flags That Were Ignored:

1. **Unsustainable Yield:** 20% APY with no underlying revenue
2. **Algorithmic Design Flaw:** No collateral, death spiral risk
3. **Concentration Risk:** 78% of UST locked in Anchor
4. **Hubris:** Founder ignored criticism, attacked skeptics
5. **Rapid Growth:** UST grew from \$2B to \$18B in 6 months
6. **Lack of Stress Testing:** No proven resilience

Lessons Learned

For Investors:

- Beware of unsustainable yields (¿10% on stablecoins)
- Algorithmic stablecoins are experimental and risky
- Hubris and dismissiveness are red flags

For Protocols:

- Overcollateralization is necessary for stability
- Stress test designs under extreme scenarios

For Regulators:

- Algorithmic stablecoins pose systemic risk
- Consider reserve requirements for stablecoins

Survivor: DAI vs. UST

Why did DAI survive while UST collapsed?

UST (Failed)

- No collateral
- Pure algorithm
- Death spiral possible
- Unsustainable yield

DAI (Survived)

- 150%+ overcollateralized
- Backed by ETH, USDC
- Liquidations prevent spiral
- No unrealistic yields

Key Difference: Collateral provides demand floor.
Conclusion: Overcollateralization is inefficient but necessary.

Terra 2.0: Failed Reboot

Post-Collapse Plan (May 2022):

- Abandon UST stablecoin
- Relaunch Terra blockchain as "Terra 2.0"
- Airdrop to UST/LUNA holders

Result:

- Terra 2.0 launched with minimal adoption
- New LUNA price: \$6 $\rightarrow$ \$0.50 (within months)
- Community fractured, trust destroyed

Lesson: Trust, once broken, is nearly impossible to rebuild.

Regulatory Fallout

US Response:

- SEC charged Do Kwon with fraud
- Proposed legislation requiring reserve backing

Global Response:

- South Korea: Investigation into Terraform Labs
- EU MiCA: Included stablecoin reserve requirements

Industry Impact:

- Algorithmic stablecoins largely abandoned
- FRAX increased collateral ratio to 100%
- Focus shifted to fiat-backed and overcollateralized models

Psychological Factors

Why Did People Believe?

1. **Greed:** 20% APY too attractive to pass up
2. **FOMO:** Fear of missing "next big thing"
3. **Herd Mentality:** Everyone else was buying
4. **Confirmation Bias:** Only listened to bulls
5. **Complexity:** Most users didn't understand the mechanism
6. **Charismatic Leader:** Do Kwon's confidence was persuasive

Lesson: If it sounds too good to be true, it probably is.

Summary

Key Takeaways:

- Terra/Luna was \$60B algorithmic stablecoin experiment that collapsed in May 2022
- UST-LUNA mechanism relied on arbitrage but had no collateral backing
- Anchor's 20% APY was unsustainable Ponzi-like scheme
- Death spiral: UST depeg $\rightarrow$ LUNA hyperinflation $\rightarrow$ total collapse
- \$40B+ value destroyed, triggering broader crypto contagion
- Lessons: Beware unsustainable yields, algorithmic stablecoins need collateral

Next Lecture: Lab - Testnet Lending (hands-on with Aave).

Questions for Reflection

1. What structural difference between DAI and UST prevented DAI from collapsing?
2. Could the Bitcoin reserve have saved UST if it were larger (e.g., $20B)?
3. Why did Anchor's 20% APY attract deposits despite being unsustainable?
4. How could regulators have prevented Terra collapse without banning innovation?
5. Would you invest in a new algorithmic stablecoin if it had better design?