

# Stablecoins and Central Bank Digital Currencies

ECOM215: Blockchain Economics and Digital Assets

Dr Daniele Bianchi

Queen Mary, University of London

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# Today's Agenda

Why Stablecoins?

Types of Stablecoins

Stablecoin Risks and Regulation

Central Bank Digital Currencies (CBDCs)

CBDC Trade-offs

Summary

Why Stablecoins?

# The Volatility Problem

Recall from Topic 1: Bitcoin and other cryptocurrencies are extremely volatile.

**This creates practical problems:**

- **Payments:** If you accept BTC for a \$100 item, it might be worth \$80 tomorrow
- **Lending:** How do you price a loan in an asset that moves 10% daily?
- **Smart contracts:** DeFi needs a stable unit of account

**The solution:** Create tokens that maintain a stable value, typically pegged to \$1.

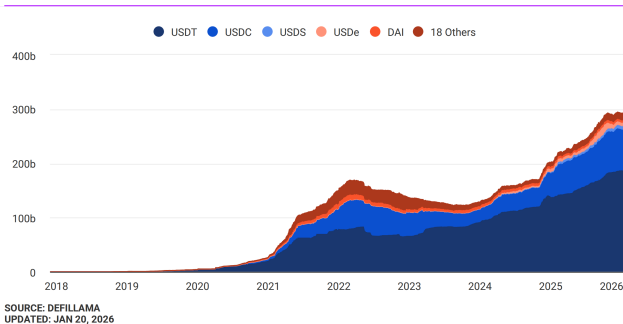
## Stablecoin

A cryptocurrency designed to maintain a stable value relative to a reference asset, most commonly the US dollar.

# Stablecoins: Market Overview



## Total Stablecoin Supply



**Dominant players:** Tether (USDT), USD Coin (USDC), and DAI.

**What stablecoins are used for:**

- Trading pairs on exchanges (BTC/USDT instead of BTC/USD)
- DeFi collateral, lending, and liquidity provision
- Cross-border payments and remittances

# Stablecoin Market Share

**Key observation:** The market is highly concentrated.

- USDT + USDC =  $\approx 90\%$  of total stablecoin market cap
- Concentration *increased* after Terra collapse (May 2022)
- Most trading volume flows through USDT

**Why this matters:**

- Systemic risk: Problems at Tether could affect entire crypto ecosystem
- Regulatory focus: Large stablecoins attract more scrutiny
- Network effects: Liquidity begets liquidity

## Types of Stablecoins

# Stablecoin Taxonomy

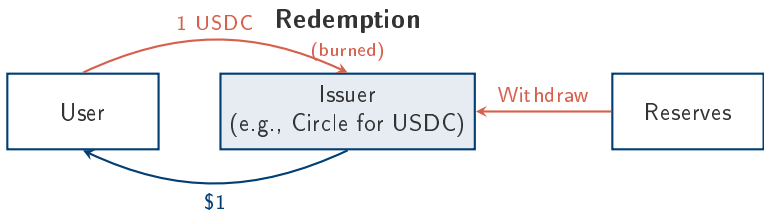
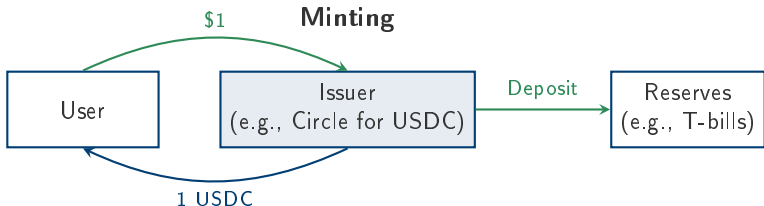
Type	Backing	Examples
Fiat-backed	USD in bank accounts, T-bills	USDT, USDC
Crypto-backed	Cryptocurrency (over-collateralised)	DAI
Algorithmic	No collateral; supply adjustments	UST (failed)
Commodity-backed	Gold, other commodities	PAXG

## Key distinction:

- **Off-chain collateral** (fiat, commodities): Requires trust in custodian
- **On-chain collateral** (crypto): Verifiable on blockchain, but volatile
- **No collateral** (algorithmic): Relies on mechanism design—fragile

We'll examine each type in detail.

# Fiat-Backed Stablecoins



**The peg is maintained by arbitrage:**

- If market price  $>$  \$1: Mint new coins, sell on market, profit
- If market price  $<$  \$1: Buy on market, redeem for \$1, profit

# Tether (USDT): The Dominant Stablecoin

## The basics:

- Launched in 2014; the largest stablecoin by far (>\$150bn)
- Issued by Tether Limited (related to Bitfinex exchange)
- Claims 1:1 backing by reserves

## The controversies:

- **No full audit:** Only “attestations” (point-in-time snapshots), not comprehensive audits
- **Reserve quality:** Previously held commercial paper, now mostly T-bills
- **Bitfinex relationship:** \$850M loan to cover Bitfinex losses (revealed 2019)
- **Regulatory settlements:** Paid \$41M to CFTC (2021) for misrepresenting reserves

Despite controversies, USDT has maintained its peg through multiple crises.

# Tether Reserve Composition

## **Current reserves (2024):**

- $\approx 80\%$  US Treasury bills
- $\approx 12\%$  Secured loans
- $\approx 5\%$  Bitcoin and precious metals
- $\approx 3\%$  Other investments

**Evolution:** Tether has shifted toward safer assets after criticism.

- 2021:  $\approx 50\%$  commercial paper (risky corporate debt)
- 2024: Mostly T-bills (much safer)

**The trust problem:** Users must trust Tether's self-reported numbers. Without a full audit, reserve claims cannot be independently verified.

# USD Coin (USDC): The “Transparent” Alternative

## The basics:

- Launched 2018 by Circle (in partnership with Coinbase)
- Second largest stablecoin ( $\approx$ \$70bn)
- Positioned as the regulated, transparent option

## Key differences from USDT:

- Monthly attestations from Big Four accounting firm (Grant Thornton, now Deloitte)
- Reserves held in regulated US financial institutions
- Circle is a licensed money transmitter
- More detailed reserve disclosures

## Reserve composition (2024):

- $\approx$ 80% short-dated US Treasuries
- $\approx$ 20% cash at regulated banks

USDC was seen as “safer”—until March 2023.

# Case Study: The USDC Depeg (March 2023)

## What happened:

- March 10, 2023: Silicon Valley Bank (SVB) collapses
- Circle reveals \$3.3 billion of USDC reserves ( $\approx 8\%$ ) held at SVB
- Panic: Will Circle be able to redeem at \$1?
- USDC drops to **\$0.87** on some exchanges

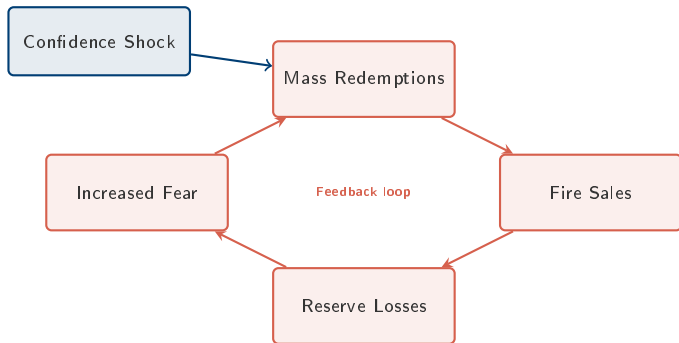
## The resolution:

- March 12: US government guarantees all SVB deposits
- Circle confirms full access to SVB funds
- USDC returns to \$1 peg within 48 hours

## Lessons:

- Even “safe” stablecoins face bank counterparty risk
- Transparency helped: Circle disclosed exposure quickly
- Government backstop restored confidence

# Fiat-Backed Stablecoins: The Bank Run Problem



Fiat-backed stablecoins face the same run dynamics as traditional banks.

**Key difference:** No deposit insurance, no backstop.

## Mitigants:

- Hold only safest, most liquid assets (T-bills)
- Maintain reserves  $\geq 100\%$  of issued stablecoins
- Redemption gates during stress (controversial)

# Crypto-Backed Stablecoins

**Crypto-Backed Stablecoins:** Collateral in the form of other cryptocurrencies.

**Problem:** If collateral is volatile crypto, how do you maintain a \$1 peg?

**Solution:** Require *more* collateral than the stablecoins issued.

**Example:** To mint \$100 of stablecoins, deposit \$150 of ETH.

- If ETH drops 20%, collateral is still worth \$120
- Stablecoins remain fully backed
- If collateral drops too far, it gets liquidated

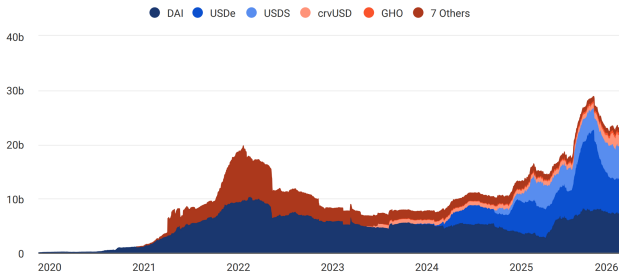
**Trade-off:**

- **Transparent:** Collateral is on-chain, verifiable
- **No bank counterparty risk**
- **Capital inefficient:** Need \$150 to create \$100
- **Inherits crypto volatility risks**

# DAI: The Leading Crypto-Backed Stablecoin



## Total Crypto-backed and Algorithmic Stablecoin Supply on Ethereum



SOURCE: THE BLOCK  
UPDATED: JAN 19, 2026

## The basics:

- Launched 2017 by MakerDAO
- Decentralised: No single company controls it
- DAI is essentially a loan against your crypto (i.e., DeFi lending)

# DAI: Collateralisation and Liquidation

**Example:** You deposit 1 ETH (worth \$3,000) as collateral.

- Minimum collateralisation ratio: 150%
- Maximum DAI you can mint:  $\$3,000 / 1.5 = \$2,000$
- You mint \$1,500 DAI (200% collateralisation, safer)

**If ETH drops to \$2,000:**

- Your collateral ratio:  $\$2,000 / \$1,500 = 133\%$
- Below 150% threshold → **Liquidation risk**
- Liquidators can repay part of your debt and seize collateral at a discount

**Why this maintains the peg:**

- DAI is always backed by  $>100\%$  collateral value
- Liquidations ensure undercollateralised positions are closed
- If  $DAI < \$1$ : Cheaper to repay debt, reducing supply
- If  $DAI > \$1$ : Profitable to mint more, increasing supply

# DAI Collateral Composition

**Evolution:** DAI was originally backed only by ETH. Now accepts multiple collateral types:

- ETH and wrapped ETH variants ( $\approx 40\%$ )
- USDC and other stablecoins ( $\approx 30\%$ )
- Real-world assets (emerging category)
- Other approved tokens

**The USDC controversy:**

- DAI claims to be “decentralised”
- But  $\approx 30\%$  backed by USDC (centralised, can freeze addresses)
- During March 2023 USDC depeg, DAI also dropped briefly
- Tension between stability and decentralisation

# Algorithmic Stablecoins

**Idea:** Maintain the peg through supply adjustments, not collateral.

**If price > \$1:** Increase supply (mint new coins) → price falls

**If price < \$1:** Decrease supply (remove coins) → price rises

**The challenge:** Increasing supply is easy. How do you *decrease* supply?

**Common mechanisms:**

- **Seigniorage shares:** Issue “bonds” that promise future stablecoins
- **Dual-token:** Absorb volatility into a second token
- **Rebase:** Automatically adjust everyone’s balances

All of these require **continued confidence** in the system. If confidence breaks, there’s no collateral to fall back on.

# Terra/Luna: Anatomy of a Collapse

## **The mechanism** (simplified):

- UST (stablecoin) paired with LUNA (volatile token)
- To mint 1 UST: Burn \$1 worth of LUNA
- To redeem 1 UST: Burn UST, receive \$1 worth of LUNA
- Arbitrage should maintain the peg

**The sweetener:** Anchor protocol paid **20% APY** on UST deposits.

## **At peak** (April 2022):

- UST market cap:  $\approx$ \$18 billion
- LUNA market cap:  $\approx$ \$40 billion
- LUNA price:  $\approx$ \$80

# The Death Spiral (May 2022)

## May 7-13, 2022:

1. Large UST withdrawals from Anchor (confidence shock)
2. UST drops slightly below \$1
3. Holders redeem UST for LUNA (minting new LUNA)
4. LUNA supply increases → LUNA price falls
5. Now \$1 of LUNA is worth less → need more LUNA per UST redeemed
6. LUNA supply explodes: 350 million → 6.5 *trillion*
7. LUNA price: \$80 → \$0.0001
8. With LUNA worthless, UST has no redemption value
9. UST collapses to \$0.10

**Total losses:** ≈\$60 billion in value destroyed in one week.

# Why Algorithmic Stablecoins Are Fragile

**The fundamental problem:** Circular backing.

- UST's value depends on ability to redeem for LUNA
- LUNA's value depends on demand for UST
- If one loses confidence, both collapse

**Contrast with fiat-backed:**

- USDC is backed by T-bills
- T-bills have value independent of USDC demand
- External collateral breaks the reflexivity

**Lesson:** Algorithmic stablecoins can work during good times. The question is whether they survive bad times. Terra didn't.

No algorithmic stablecoin has achieved both scale and long-term stability.

# Stablecoin Risks and Regulation

# Summary of Stablecoin Risks

Risk	Description
Run risk	Mass redemptions exhaust reserves
Reserve quality	Illiquid or risky assets can't meet redemptions
Counterparty risk	Bank failures, custodian problems
Operational risk	Smart contract bugs, key management
Concentration	Few stablecoins dominate; failure is systemic
Regulatory	Legal status unclear; potential bans or restrictions

**Systemic concern:** Stablecoins are deeply embedded in crypto markets. A major stablecoin failure could trigger cascading liquidations across DeFi.

# Regulatory Landscape: Europe (MiCA)

The EU's **Markets in Crypto-Assets Regulation** (MiCA) came into force in 2024.

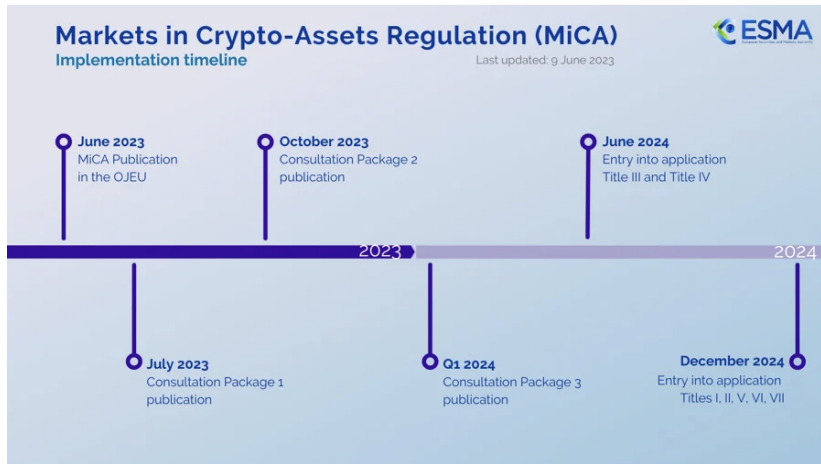
## Key requirements for stablecoin issuers:

- Must be authorised as an electronic money institution
- Reserves must be 1:1 and held in secure, liquid assets
- Regular audits and public disclosures required
- Significant stablecoins face stricter capital requirements
- Issuers must have EU presence

## Impact:

- Tether (USDT) delisted from some EU exchanges
- USDC pursuing MiCA compliance
- Creates regulatory clarity but raises compliance costs

# Regulatory Landscape: Europe (MiCA)



# Regulatory Landscape: United States

**Current state:** Fragmented, no comprehensive stablecoin law.

## **Key developments:**

- SEC: Some stablecoins may be securities
- CFTC: Enforcement actions against Tether
- OCC: National banks can hold stablecoin reserves
- Congress: Multiple stablecoin bills proposed, none passed

## **Proposed requirements** (various bills):

- 1:1 reserve backing in high-quality liquid assets
- Bank-like regulatory oversight
- Regular examinations and disclosures
- Potential Fed approval for large issuers

**Uncertainty:** Regulatory approach depends heavily on political landscape and may shift significantly.

# Stablecoins vs Traditional Payment Systems

	<b>Wire Transfer</b>	<b>Card Payment</b>	<b>Stablecoin</b>
Settlement	1-3 days	1-2 days	Minutes
Availability	Business hours	24/7	24/7
Cross-border	Expensive	Fees apply	Low cost
Access	Bank account	Card issuer	Wallet only
Reversibility	Possible	Chargebacks	Generally not

**Stablecoin advantages:** Speed, availability, programmability

**Stablecoin disadvantages:** No consumer protections, regulatory uncertainty, counterparty risks

For some use cases (remittances, DeFi), stablecoins offer clear benefits. For everyday consumer payments, traditional systems may be preferable.

## Central Bank Digital Currencies (CBDCs)

# What is a CBDC?

## Central Bank Digital Currency

A digital form of central bank money, denominated in the national currency and issued as a direct liability of the central bank.

### How it differs from:

- **Physical cash:** Digital, not physical
- **Bank deposits:** Direct central bank liability, not commercial bank
- **Stablecoins:** Issued by government, not private company
- **Bitcoin:** Centralised issuance, not decentralised

**Key point:** A CBDC would give citizens direct access to central bank money in digital form—something currently only banks have.

# Retail vs Wholesale CBDCs

**Retail CBDC:** Available to households and businesses

- Used for everyday transactions
- Competes with cash and bank deposits
- Examples: Digital Yuan (China), Sand Dollar (Bahamas)

**Wholesale CBDC:** Available only to financial institutions

- Used for interbank settlements
- Competes with existing reserve systems
- Examples: Project Helvetia (Switzerland), various pilots

Most public discussion focuses on **retail CBDCs**—these raise the most significant policy questions.

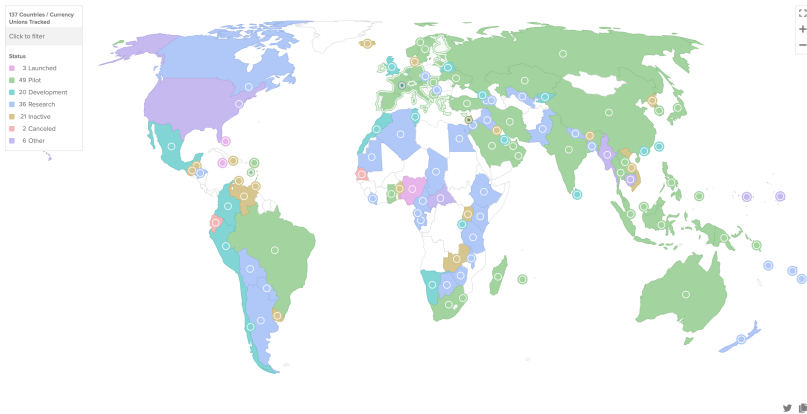
# CBDC Design Choices

## Key design decisions:

Choice	Option A	Option B
Architecture	Direct (CB manages accounts)	Intermediated (banks distribute)
Technology	Account-based (identity)	Token-based (possession)
Interest	Interest-bearing	Non-interest-bearing
Privacy	Anonymous (like cash)	Traceable (like deposits)
Limits	Unlimited holdings	Capped holdings

Most proposed CBDCs are **intermediated** (banks handle distribution) and **non-anonymous** (transactions traceable).

# Global CBDC Development



Last updated: July 2025

Source: <https://www.atlanticcouncil.org/cbdctracker/>

# Why Are Central Banks Interested?

## **Advanced economies:**

- Payment system resilience and efficiency
- Declining cash usage (especially Nordics)
- Respond to private stablecoins
- Maintain monetary sovereignty

## **Emerging economies:**

- Financial inclusion (unbanked populations)
- Reduce cash handling costs
- Combat informal economy
- Improve cross-border payments

Different motivations lead to different designs.

## CBDC Trade-offs

# The Bank Disintermediation Problem

**The concern:** If citizens can hold money directly at the central bank, why keep deposits at commercial banks?

## **Potential consequences:**

- Deposits flow from banks to CBDC
- Banks lose cheap funding source
- Banks must rely on wholesale funding (more expensive)
- Credit availability may decrease
- During crises, “digital bank runs” could be instantaneous

## **Proposed mitigants:**

- Cap CBDC holdings (e.g., €3,000 per person—ECB proposal)
- Make CBDC non-interest-bearing (less attractive than deposits)
- Tiered remuneration (penalty rate above threshold)

# Privacy vs Surveillance

**The tension:** CBDCs could offer cash-like privacy or enable unprecedented surveillance.

## **Privacy advocates worry:**

- Every transaction could be tracked by the state
- Spending patterns reveal sensitive information
- Potential for political targeting or social control
- “Programmable money” could restrict what you buy

## **Authorities argue:**

- Traceability needed for anti-money laundering (AML)
- Tax compliance requires some visibility
- Anonymity enables illicit finance
- Can design tiered privacy (anonymous for small amounts)

Design choices here reflect fundamental values about the state-citizen relationship.

# Monetary Policy Implications

## New tools:

- **Direct transmission:** Interest on CBDC goes straight to public
- **Negative rates:** Could charge for holding CBDC (harder with cash)
- **Helicopter money:** Direct transfers to citizens
- **Programmability:** Time-limited spending vouchers

## Concerns:

- Do we want central banks to have these powers?
- Negative rates on CBDC could be deeply unpopular
- Programmable restrictions raise civil liberties questions
- Expiring money could face legal challenges

CBDCs don't require these features, but they make them technically possible.

# CBDCs vs Stablecoins: A Comparison

	Stablecoins	CBDCs
Issuer	Private companies	Central bank
Backing	Reserves (varies)	Full faith of government
Regulation	Evolving	Government-controlled
Privacy	Pseudonymous	Design-dependent
Innovation	Rapid	Slow, deliberate
Interoperability	Cross-chain possible	Domestic focus
Risk	Issuer default	Political risk

**Key question:** Will CBDCs replace stablecoins, coexist with them, or is there room for both serving different use cases?

## Summary

# Key Takeaways

1. **Stablecoins solve the volatility problem for crypto**
  - But stability mechanisms vary in robustness
2. **Fiat-backed stablecoins dominate but require trust**
  - USDT: Largest, controversial reserves
  - USDC: More transparent, but March 2023 showed bank risk
3. **Crypto-backed stablecoins are transparent but capital-inefficient**
  - DAI: Over-collateralised, liquidation-protected
4. **Algorithmic stablecoins are fragile**
  - Terra/Luna: \$60B destroyed in circular collapse
5. **CBDCs offer government-backed digital money**
  - Trade-offs: Disintermediation, privacy, monetary policy power

# What's Next

## Topic 6: Digital Ownership and Tokenization

- What is Tokenization?
- Token standards
- The rise and fall of the NFT market
- Practical applications

### Preparation:

- Think about: can blockchain help to rebuild the infrastructure for financial services?
- Explore: the role of blockchain in digital ownership and property rights.

Questions?