L05 — Token Economics

Cheatsheet

Token Types

Type	Purpose	Examples
Utility	Access product/service	BAT, FIL, LINK
Governance	Protocol voting rights	UNI, AAVE, MKR
Security	Investment contract	STOs, tokenised equity
Stablecoin	Price-stable medium	USDC, DAI, USDT
LP Token	Liquidity pool share	UNI-V2-LP, sBTC/ETH
NFT	Unique asset ownership	CryptoPunks, BAYC

Coin vs. Token: Coins are protocol-level (BTC, ETH); tokens are application-level, created via smart contracts (ERC-20 standard on Ethereum).

Howey Test (US security classification): (1) investment of money, (2) in a common enterprise, (3) with expectation of profits, (4) from efforts of others. If all four met ⇒ security token, subject to SEC regulation.

Supply Mechanics

Key Supply Metrics

Circulating supply: tokens currently tradeable.
Total supply: all tokens ever minted minus burned.
Max supply: hard cap; may not exist (e.g. ETH has no cap).

Model	Description / Example
Fixed (deflationary)	Hard cap; scarcity increases. Bitcoin: 21M max
Inflationary	Continuous issuance funds security. ETH PoS ≈0.5%/yr; Cosmos 7–10%
Deflationary	Burns exceed issuance; net supply falls. ETH post-EIP-1559 during high usage
Elastic	Supply adjusts to target price. Ampleforth (AMPL) rebases daily

Real yield (for staking): Real Yield = Nominal APY − Inflation Rate. Non-stakers are diluted by the full inflation rate.

Bitcoin Halving

Every **210,000 blocks** (≈4 years) the block subsidy halves.

Year	Event	Reward (BTC)
2009	Genesis	50
2012	1st halving	25
2016	2nd halving	12.5
2020	3rd halving	6.25
2024	4th halving	3.125
2028	5th halving (est.)	1.5625
≈2140	Last BTC mined	→ 0

Total supply approaches 21,000,000 BTC asymptotically (geometric series: $\sum_{k=0}^{\infty} \frac{210{,}000 \times 50}{2^k} = 21{,}000{,}000$).
After all BTC mined, miner revenue = transaction fees only.

Token Distribution Models

Model	Characteristics
Fair launch	No pre-mine, no pre-sale; equal start. Bitcoin, Dogecoin, Monero
ICO / TGE	Public sale at launch. 2017–18 boom; most failed or were scams
Airdrop	Free distribution. Uniswap: 400 UNI/user; ENS, Optimism OP
Mining	Earned via PoW; permissionless but hardware-intensive
Pre-mine	Tokens allocated before public launch; team/VC/foundation receive allocation

Typical pre-mine allocations: Team/founders 15–25% | Investors 10–20% | Treasury 10–20% | Community 40–60%.

TGE unlock: only 5–20% of total supply typically unlocked at launch; remainder under vesting. Large TGE unlock (>20%) signals high sell pressure risk.

Vesting Schedules

Purpose: lock team/investor tokens to align long-term incentives; prevent immediate selling after launch.

Common structures:

- **Cliff + linear**: 1-year cliff (no tokens), then monthly linear release over 2–3 years. Typical VC: 1y cliff + 3y linear = 4y total.
- **Pure linear**: equal monthly release from day 1.
- **Milestone-based**: tokens unlock on product deliverables.

Smart contract enforcement: vesting contracts hold tokens in escrow and release according to on-chain schedule; team cannot bypass.

Red flags: no cliff, <1y vesting, >20% TGE unlock, anonymous team.

Stablecoin Types

Type	Mechanism	Examples
Fiat-backed	1:1 reserve of USD in bank	USDC, USDT, BUSD
Crypto-backed	Over-collateralised vault (e.g. 150% ETH)	DAI, LUSD
Algorithmic	Smart contract adjusts supply to maintain peg	FRAX, UST (collapsed)

Over-collateralisation (crypto-backed): deposit 150 USD of ETH to mint 100 DAI. Liquidated if collateral ratio falls below threshold.

UST collapse (May 2022): Luna/Terra algorithmic stablecoin lost its peg in a death spiral; $40B+ wiped out in days.

Market Cap vs. FDV

Key Valuation Formulas

Market Cap = Price × Circulating Supply
FDV = Price × Max Supply
FDV/MCap ratio $\gg 1 \Rightarrow$ significant future dilution risk

Interpretation: Low circulating supply can inflate apparent market cap. A token with 5% circulating supply has FDV = 20× market cap — if all tokens unlock at current price, dilution is severe.

Token velocity (from quantity theory $MV = PQ$):

$$P = \frac{Q}{M \times V}$$

High velocity V (buy-use-sell immediately) suppresses price P. Solutions: staking, governance rights, fee discounts, burns.

Token Burns

Definition: permanently remove tokens by sending to an unspendable address or via smart contract destruction.

Methods:

- Burn address (e.g. `0x000...dead`)
- Automatic protocol burns (EIP-1559)
- Buyback-and-burn (BNB, MKR)
- Community burns (SHIB)

EIP-1559 (August 2021): Ethereum base fee is burned; tips go to validators. Net issuance = new ETH issued − base fee burned. When network usage is high: net issuance < 0 ("ultrasound money"). >3.5M ETH burned since EIP-1559 activation.

BNB: Binance burns quarterly until 100M BNB remain (from 200M initial).

Governance Tokens

What holders vote on: protocol upgrades, fee parameters, treasury spending, collateral types, emergency actions.

Token	Governance Scope
UNI	Uniswap fees, grants, treasury (>$3B)
MKR	MakerDAO collateral types, stability fees; buyback-and-burn from revenue
AAVE	Risk parameters, asset listings, safety module
CRV	Gauge weights (reward direction); veCRV locks earn fees + bribes

Delegation: token holders can delegate voting power to active delegates without transferring custody. Enables participation without monitoring every proposal.

Plutocracy risk: 1 token = 1 vote favours large holders; whale coordination can capture governance.

Key Formulas

Formula	Expression
Market Cap	$P \times S_{\text{circ}}$
FDV	$P \times S_{\max}$
Inflation rate	$\frac{S_{t+1}-S_t}{S_t}$
Real yield	$r_{\text{nominal}} - \pi$
Token price (MV=PQ)	$P = Q\,/\,(M \cdot V)$
Collateral ratio	$\text{CR} = \frac{\text{Collateral value}}{\text{Minted stablecoin}}$
Net ETH issuance	Issued − Burned base fees
Halving supply sum	$\sum_{k=0}^{\infty} \frac{210000 \times 50}{2^k} = 21\text{M}$

Tokenomics Red Flags

- Team >30% with short/no vesting
- FDV/MCap $\gg 1$ at launch
- No token utility or value accrual
- Yields >100% APY with no revenue source
- Anonymous team; no accountability