

# Digital Finance Glossary

## Key Terms Across All 8 Modules

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Digital Finance — BSc Course

## Module 1: The Cost Problem (1/2)

- **Acquirer** — The merchant's bank that processes card payments and settles funds to the merchant's account.
- **BNPL** — Buy Now Pay Later — short-term installment financing where the merchant pays the MDR and the consumer pays zero interest.
- **CAC** — Customer Acquisition Cost — total spend to acquire one new customer. Viable fintechs target  $LTV/CAC > 3\times$ .
- **Card Network** — Organization (Visa, Mastercard) that sets interchange rates, routes transactions, and enforces rules across issuers and acquirers.
- **Card-Not-Present (CNP)** — A transaction where the card is not physically present (e.g., online purchase). Typically carries higher interchange.
- **Cross-Border Payment** — A payment where payer and payee are in different countries, typically involving currency conversion and correspondent banking.
- **Durbin Amendment** — US regulation (2010) capping debit card interchange fees for banks with assets above \$10 billion.
- **EU IFR** — Interchange Fee Regulation — EU law capping consumer debit interchange at 0.2% and credit at 0.3%.
- **Five-Party Model** — The standard card payment model: cardholder, merchant, issuer, acquirer, card network.

## Module 1: The Cost Problem (2/2)

- **Gateway Fee** — Fee charged by the payment gateway for routing the transaction from merchant to processor.
- **Interchange Fee** — Fee paid by the acquirer to the issuer on each card transaction. Largest component of MDR (60–70%).
- **Issuer** — The cardholder's bank that issues the payment card and extends credit or provides account access.
- **LTV** — Lifetime Value — total net revenue a customer generates over their relationship with the firm.
- **MDR** — Merchant Discount Rate — total percentage fee a merchant pays per card transaction. Sum of interchange + network + processor + acquirer + gateway fees.
- **Network Assessment Fee** — Small fee paid by the acquirer to the card network (Visa/Mastercard) for each transaction processed.
- **P2P Lending** — Peer-to-peer lending — platforms connecting individual borrowers and lenders, bypassing traditional bank intermediation.
- **Platform Economics** — Business models where value is created by facilitating interactions between two or more user groups (two-sided markets).
- **Processor Fee** — Fee charged by the payment processor for authorizing, clearing, and settling the transaction.
- **Two-Sided Market** — A market where a platform serves two interdependent user groups (e.g., cardholders and merchants) and must balance pricing to attract both sides.
- **Unit Economics** — Per-customer profitability analysis: revenue streams minus variable costs, expressed as LTV/CAC ratio.

## Module 2: The Access Problem (1/2)

- **Algorithmic Fairness** — Ensuring automated decision-making systems do not produce systematically biased outcomes across protected groups.
- **Alternative Data** — Non-traditional data sources (mobile usage, utility payments, social media) used to assess creditworthiness of thin-file borrowers.
- **Credit Invisible** — An individual with no credit history at traditional bureaus, making them unscorable by conventional models.
- **Demographic Parity** — Fairness criterion requiring the positive-prediction rate be equal across protected groups: for protected attribute  $A \in \{0, 1\}$  and binary prediction  $\hat{Y}$ ,  $P(\hat{Y} = 1 \mid A = 0) = P(\hat{Y} = 1 \mid A = 1)$ . Does *not* condition on the true label  $Y$ , so can reject qualified candidates to equalise rates. Contrast with equalised odds and calibration.
- **Disparate Impact** — When a facially neutral policy produces disproportionately adverse outcomes for a protected group, even without discriminatory intent.
- **Disparate Treatment** — Intentionally treating individuals differently based on a protected characteristic (e.g., race, gender).
- **Equalized Odds** — Fairness criterion requiring equal true positive and false positive rates across groups.
- **Financial Exclusion** — The state of lacking access to affordable, appropriate financial services from regulated providers.

## Module 2: The Access Problem (2/2)

- **Fractional Shares** — Ownership of less than one full share of a security, enabling investment with as little as \$1.
- **Gamification** — Use of game-design elements (streaks, leaderboards, confetti) in non-game contexts like trading apps. Can encourage overtrading.
- **Impossibility Theorem** — Result proved independently by Chouldechova (2017) and Kleinberg, Mullainathan & Raghavan (2017) showing that when base rates differ across protected groups, three natural fairness criteria — calibration, balance for positive class, balance for negative class — cannot all hold simultaneously except in degenerate cases. Forces practitioners to choose one, not all.
- **M-Pesa** — Mobile money service launched in Kenya (2007) enabling financial transactions via SMS on basic phones. A leapfrog technology for financial inclusion.
- **Microfinance** — Provision of small loans, savings, and insurance to low-income individuals who lack access to traditional banking.
- **Neobank** — A digital-only bank with no physical branches, offering accounts, payments, and lending via a mobile app.
- **Open Banking** — Regulatory framework (e.g., PSD2 in EU) requiring banks to share customer data with authorized third parties via APIs, with customer consent.
- **PSD2** — Payment Services Directive 2 — EU regulation mandating Strong Customer Authentication (SCA) and open access to payment accounts via APIs.
- **Robo-Advisor** — Algorithm-driven platform providing automated portfolio management (asset allocation, rebalancing, tax-loss harvesting) at low cost.
- **Thin File** — A credit file with too few data points for a reliable traditional credit score, common among young adults and immigrants.
- **Unbanked** — An adult without an account at a formal financial institution. Approximately 1.4 billion globally.
- **Underbanked** — An adult with a bank account who still relies on alternative financial services (payday lenders, check cashers).

## Module 3: The Trust Problem (1/2)

- **AMM** — Automated Market Maker — a smart contract that holds token reserves  $(x, y)$  and computes swap outputs from a constant-function invariant such as  $x \cdot y = k$  (Uniswap V2). Price is implicit in the instantaneous slope  $\partial y / \partial x$ ; traders *impose* a price by executing a swap, they do not post a quote.
- **Avalanche Effect** — A property of cryptographic hash functions where a single-bit input change produces a drastically different output.
- **BFT** — Byzantine Fault Tolerance — ability of a distributed system to function correctly even when up to  $f$  of  $n$  nodes are malicious. Requires  $n \geq 3f + 1$ .
- **Block Reward** — Cryptocurrency awarded to miners/validators for successfully proposing a new block. Incentivizes honest participation.
- **Blockchain Trilemma** — The observation that blockchain systems can optimize at most two of three properties: security, decentralization, and scalability.
- **Consensus Mechanism** — Protocol by which distributed nodes agree on the current state of the ledger (e.g., PoW, PoS, PBFT).
- **Constant Product Formula** — AMM invariant  $x \cdot y = k$  where  $x$  and  $y$  are token reserves. Larger trades cause greater price slippage.
- **DeFi** — Decentralized Finance — financial services (lending, trading, insurance) built on smart contracts without intermediaries.
- **Digital Signature** — Cryptographic proof that a message was created by the holder of a specific private key, providing authentication and non-repudiation.

## Module 3: The Trust Problem (2/2)

- **ERC-20** — Ethereum token standard for fungible tokens (currencies, stablecoins, governance tokens).
- **ERC-721** — Ethereum token standard for non-fungible tokens (NFTs) — each token is unique.
- **EVM** — Ethereum Virtual Machine — the runtime environment executing smart contracts deterministically on every node.
- **Flash Loan** — An uncollateralized loan that must be borrowed and repaid within a single blockchain transaction. Used in arbitrage and exploits.
- **Gas** — Unit measuring computational effort on Ethereum. Users pay gas fees (in gwei) to compensate validators for execution.
- **Hash Function** — A function mapping arbitrary-length input to fixed-length output. Must be deterministic, one-way, and collision-resistant.
- **Impermanent Loss** — Loss incurred by AMM liquidity providers when token prices diverge from the ratio at deposit time.
- **Merkle Tree** — A binary tree of hashes enabling efficient transaction verification in  $O(\log n)$  via inclusion proofs.
- **Oracle** — A service providing external data (prices, events) to smart contracts. Oracle manipulation is a major DeFi attack vector.
- **PoS** — Proof of Stake — consensus where validators lock capital as collateral. Malicious behavior is punished by slashing (losing staked funds).
- **PoW** — Proof of Work — consensus where miners compete to solve computational puzzles. Converts electricity into security.
- **Reentrancy Attack** — A smart contract exploit where a malicious contract recursively calls back into the victim contract before state is updated.
- **Rollup** — Layer-2 scaling solution that executes transactions off-chain and posts compressed data to L1 for security. Types: optimistic, zero-knowledge.
- **SHA-256** — Secure Hash Algorithm producing a 256-bit output. The most widely used hash in blockchain and financial cryptography.
- **Slippage** — The difference between expected and actual execution price in an AMM trade, caused by limited liquidity.
- **Smart Contract** — Self-executing code deployed on a blockchain that automatically enforces the terms of an agreement.
- **Stablecoin** — A cryptocurrency designed to maintain a stable value relative to a reference asset. Three types: fiat-backed, crypto-collateralized, algorithmic.
- **TVL** — Total Value Locked — the total amount of assets deposited in a DeFi protocol. Used as a measure of protocol adoption.

## Module 4: The Risk Problem (1/2)

- **Basel III** — International regulatory framework (2010–2019) requiring higher capital ratios, liquidity rules (LCR, NSFR), and a leverage ratio for banks.
- **Basel III.1 / “IV”** — Updated standards (2023+) introducing an output floor, revised standardized approaches, and reduced reliance on internal models.
- **Black-Scholes Model** — Option pricing formula deriving the theoretical price of European options from five inputs: stock price, strike, time, risk-free rate, volatility.
- **Call Option** — A contract giving the holder the right (not obligation) to buy an asset at a specified price (strike) before a specified date.
- **CET1 Ratio** — Common Equity Tier 1 capital divided by risk-weighted assets. Basel III minimum: 4.5%.
- **CVaR / ES** — Conditional Value-at-Risk / Expected Shortfall — the average loss in the tail beyond VaR. Always  $\geq$  VaR.
- **Cyber Risk** — Risk of financial loss from cyberattacks. Violates stationarity assumptions underlying traditional risk models.
- **Delta ( $\Delta$ )** — Option price change per \$1 move in the underlying. Measures stock-equivalent exposure.

## Module 4: The Risk Problem (2/2)

- **Flash Crash** — Extremely rapid market decline and recovery (minutes), often triggered by algorithmic trading cascades.
- **Gamma ( $\Gamma$ )** — Rate of change of Delta. High Gamma means Delta changes rapidly — important near expiration.
- **Greeks** — Sensitivity measures for option prices: Delta, Gamma, Vega, Theta, Rho. Used for risk management, not pricing.
- **Historical Simulation** — VaR method using actual past returns. No distributional assumptions, but depends on history being representative.
- **LCR** — Liquidity Coverage Ratio — high-quality liquid assets divided by 30-day net cash outflows. Basel III minimum: 100%.
- **Leverage Ratio** — Tier 1 capital divided by total exposure (including off-balance-sheet). A non-risk-weighted backstop to capital ratios.
- **Monte Carlo Simulation** — VaR method generating thousands of random return scenarios from a statistical model. Flexible but computationally expensive.
- **NSFR** — Net Stable Funding Ratio — available stable funding divided by required stable funding. Addresses long-term liquidity risk.
- **Put Option** — A contract giving the holder the right (not obligation) to sell an asset at a specified price (strike) before a specified date.
- **Risk-Weighted Assets (RWA)** — Assets weighted by credit risk. Cash = 0%, government bonds = 0–20%, corporate loans = 100%, equities = up to 250%.
- **Theta ( $\Theta$ )** — Time decay — how much an option loses per day, all else equal. Always negative for long options.
- **VaR** — Value-at-Risk — the maximum loss expected at a given confidence level over a specified time horizon.
- **Variance-Covariance** — VaR method assuming returns are normally distributed. Fast but underestimates tail risk.
- **Vega** — Option price sensitivity to a 1 percentage-point change in implied volatility.
- **Volatility** — Standard deviation of returns. Measures the magnitude of price fluctuations, regardless of direction.

## Module 5: The Automation Problem (1/2)

- **Attention Mechanism** — Neural network component that learns which parts of the input are most relevant for each output token. Core of the transformer.
- **Bias (Statistical)** — Systematic error from overly simplistic model assumptions. High bias = underfitting.
- **Bias-Variance Trade-off** — Fundamental ML tension: simpler models have high bias (underfit), complex models have high variance (overfit).
- **Classification** — ML task predicting a category label (e.g., default/no default, fraud/legitimate).
- **Concept Drift** — Change in the relationship between input features and target variable:  $P(Y|X)$  shifts over time.
- **Covariate Shift** — Change in input distribution  $P(X)$  while  $P(Y|X)$  remains stable.
- **Cross-Validation** — Technique splitting data into  $k$  folds, training on  $k - 1$  and testing on the held-out fold, rotating to reduce variance of performance estimates.
- **Data Drift** — Change in input feature distributions:  $P(X)$  shifts, potentially degrading model performance.
- **Data Snooping** — Using test data or future information during model development, leading to inflated performance estimates.

## Module 5: The Automation Problem (2/2)

- **Feature Engineering** — Creating informative input variables from raw data (e.g., moving averages, volatility ratios, lagged returns).
- **GenAI** — Generative AI — models that create new content (text, code, images) rather than classify or predict.
- **Hallucination** — When an LLM generates plausible-sounding but factually incorrect output. Critical risk in financial applications.
- **LLM** — Large Language Model — a neural network with billions of parameters trained to predict the next token. Does not “understand” finance.
- **Look-Ahead Bias** — Using information that was not available at the time of the decision (e.g., restated earnings in a backtest).
- **MLOps** — Machine Learning Operations — DevOps principles (automation, monitoring, versioning, governance) applied to the ML lifecycle.
- **Overfitting** — Model memorizes training data noise, performing well on training data but poorly on unseen data.
- **RAG** — Retrieval-Augmented Generation — combining LLM generation with retrieval from a curated document corpus to reduce hallucinations.
- **Regime Change** — Structural break in market behavior where statistical properties (mean, variance, correlations) shift abruptly.
- **Regression** — ML task predicting a continuous numerical value (e.g., stock return, credit spread).
- **Stationarity** — Property of a time series whose mean, variance, and autocorrelation do not change over time. Financial data rarely satisfies this.
- **Survivorship Bias** — Backtesting only on entities that still exist, excluding bankruptcies and delistings, leading to overly optimistic results.
- **Transformer** — Neural network architecture using self-attention to process sequences in parallel. Foundation of GPT, BERT, and modern LLMs.
- **Underfitting** — Model is too simple to capture the underlying pattern. Both training and test errors are high.
- **Variance (Statistical)** — Sensitivity of the model to the specific training data used. High variance = overfitting.

## Module 6: The Infrastructure Problem (1/2)

- **ACH** — Automated Clearing House — US batch payment system for payroll, bill pay, and direct debit. Uses deferred net settlement.
- **API** — Application Programming Interface — a contract defining how two software systems communicate. The connective tissue of digital finance.
- **API Gateway** — Central entry point that routes, authenticates, rate-limits, and logs all API calls. The control plane of modern banking.
- **BaaS** — Banking-as-a-Service — a model where licensed banks provide banking infrastructure (accounts, cards, payments) to fintechs via APIs.
- **CBDC** — Central Bank Digital Currency — digital form of central bank money. Retail (public) or wholesale (interbank).
- **COBOL** — Legacy programming language (1959) still running many core banking systems. Declining developer workforce creates maintenance risk.
- **Core Banking System** — The central IT system processing a bank's daily transactions: accounts, payments, loans, interest. The "operating system" of a bank.
- **Correspondent Banking** — A network of bilateral agreements where banks hold accounts at other banks to facilitate cross-border payments.

## Module 6: The Infrastructure Problem (2/2)

- **DNS** — Deferred Net Settlement — payments accumulated over a period and settled as net positions. Lower liquidity cost but settlement risk during the window.
- **Embedded Finance** — Integrating financial services (payments, lending, insurance) into non-financial platforms (e-commerce, ride-sharing, SaaS).
- **General Ledger** — The foundational accounting record in a core banking system. Every transaction ultimately posts to the general ledger.
- **GraphQL** — API query language allowing clients to request exactly the data fields they need. Alternative to REST for complex data relationships.
- **mTLS** — Mutual Transport Layer Security — both client and server authenticate each other via certificates. Stronger than one-way TLS.
- **OAuth 2.0** — Authorization framework allowing third-party applications to access user resources with scoped permissions and without sharing passwords.
- **Programmable Money** — Digital currency with embedded rules (e.g., spending restrictions, expiry dates). Enabled by CBDCs and smart contracts.
- **REST** — Representational State Transfer — the dominant API architectural style, using HTTP methods (GET, POST, PUT, DELETE) on resource URLs.
- **RTGS** — Real-Time Gross Settlement — each payment settled individually in real time. Zero counterparty risk. Examples: Fedwire (US), TARGET2 (EU).
- **RWA Tokenization** — Representing ownership rights to real-world assets (bonds, equities, real estate) as digital tokens on a distributed ledger.
- **SEPA** — Single Euro Payments Area — EU payment integration scheme enabling euro transfers across 36 countries under uniform rules.
- **SWIFT** — Society for Worldwide Interbank Financial Telecommunication — a messaging network for cross-border payment instructions. Not a settlement system.
- **TARGET2** — Trans-European Automated Real-time Gross Settlement Express Transfer — the eurozone RTGS system operated by the Eurosystem.
- **Webhook** — Server-to-server push notification triggered by an event (e.g., payment received). Replaces polling with real-time updates.

## Module 7: The Compliance Problem (1/2)

- **AML** — Anti-Money Laundering — laws, regulations, and procedures to prevent criminals from disguising illegally obtained funds as legitimate income.
- **ART** — Asset-Referenced Token (MiCA) — a crypto-asset referencing multiple assets or currencies. Subject to strict reserve and governance requirements.
- **CDD** — Customer Due Diligence — standard identity verification and risk assessment performed at customer onboarding.
- **DORA** — Digital Operational Resilience Act — EU regulation requiring financial entities to ensure ICT risk management and operational resilience.
- **EDD** — Enhanced Due Diligence — deeper scrutiny applied to high-risk customers: PEPs, high-risk jurisdictions, complex structures.
- **EMT** — E-Money Token (MiCA) — a crypto-asset referencing a single fiat currency. Regulated similarly to e-money.
- **EU AI Act** — EU regulation classifying AI systems by risk level. Credit scoring and insurance pricing are “high risk,” requiring human oversight and explainability.
- **FATF** — Financial Action Task Force — intergovernmental body setting global AML/CFT standards via the 40 Recommendations.

## Module 7: The Compliance Problem (2/2)

- **FIU** — Financial Intelligence Unit — national agency receiving, analyzing, and disseminating SARs to law enforcement.
- **GDPR** — General Data Protection Regulation — EU data privacy law. The “right to explanation” constrains opaque algorithmic decisions.
- **KYC** — Know Your Customer — the process of verifying a customer’s identity and assessing their risk profile before establishing a business relationship.
- **MiCA** — Markets in Crypto-Assets — EU regulation (2023) creating a comprehensive framework for crypto-asset issuers and service providers.
- **Model Risk** — The risk of adverse consequences from decisions based on incorrect or misused model outputs, including (1) fundamental errors producing inaccurate outputs and (2) incorrect use of the model or misunderstanding of its limitations. Primary US sources: SR 11-7 (Fed/OCC, 2011) and OCC Bulletin 2011-12.
- **PEP** — Politically Exposed Person — an individual holding a prominent public function, subject to enhanced due diligence.
- **PRA SS1/23** — UK Prudential Regulation Authority supervisory statement on model risk management, effective 2024. UK equivalent of SR 11-7.
- **RegTech** — Regulatory Technology — technology solutions that help financial institutions comply with regulations more efficiently and accurately.
- **SAR** — Suspicious Activity Report — mandatory filing when a financial institution detects transactions that may involve money laundering or terrorist financing.
- **SR 11-7** — April 2011 joint Fed/OCC supervisory guidance on model risk management. Establishes a three-component framework: (1) robust model development, (2) ongoing validation, (3) governance, policies, and controls. Predecessor: OCC Bulletin 2000-16.
- **Sanctions Screening** — Automated checking of customers and transactions against government sanctions lists (OFAC, EU, UN).
- **Three Lines of Defense** — Governance model: 1st line (business units), 2nd line (risk management/compliance), 3rd line (internal audit).
- **Transaction Monitoring** — Automated surveillance of transactions to detect patterns indicative of money laundering, fraud, or sanctions violations.

## Module 8: The Future of Digital Finance (1/2)

- **Biometric Payment** — Authentication using biological characteristics (fingerprint, face, iris) instead of PINs or passwords.
- **Cap-and-Trade** — Emissions trading system where regulators set an overall cap; firms buy/sell allowances. Price signal incentivizes emission reduction.
- **Carbon Credit** — A tradable certificate representing one tonne of CO<sub>2</sub> equivalent removed or avoided. Compliance vs. voluntary markets.
- **CSRD** — Corporate Sustainability Reporting Directive — EU regulation requiring large companies to disclose ESG data under European Sustainability Reporting Standards.
- **DID** — Decentralized Identifier — a globally unique identifier controlled by the subject (not a central authority). Foundation of SSI.
- **ESG** — Environmental, Social, Governance — three categories of non-financial factors used to evaluate companies alongside traditional financial metrics.
- **Federated Identity** — Identity model where a trusted third party (e.g., Google, government) vouches for the user's identity across multiple services.
- **Greenwashing** — Misleading claims about the environmental benefits of a product, service, or investment strategy.

## Module 8: The Future of Digital Finance (2/2)

- **Grover's Algorithm** — Quantum algorithm that speeds up brute-force search quadratically. Weakens symmetric ciphers: AES-128 effectively becomes AES-64.
- **Lattice-Based Cryptography** — Post-quantum cryptographic schemes based on hard problems in lattice mathematics. NIST primary selection for key exchange.
- **Post-Quantum Cryptography (PQC)** — Cryptographic algorithms resistant to both classical and quantum computers. Three NIST families: lattice, hash-based, code-based.
- **Qubit** — Fundamental unit of quantum information. Unlike a classical bit, a qubit exists in superposition of 0 and 1 until measured.
- **Scenario Planning** — Strategic method exploring multiple plausible futures along key dimensions of uncertainty (e.g., regulation × technology pace).
- **Shor's Algorithm** — Quantum algorithm that factors large integers in polynomial time, breaking RSA and elliptic-curve cryptography.
- **SSI** — Self-Sovereign Identity — identity model where individuals control their own credentials in a digital wallet, selectively disclosing attributes to verifiers.
- **Superposition** — Quantum property where a qubit exists in a combination of 0 and 1 states simultaneously, until measurement collapses it to a definite value.
- **TCFD** — Task Force on Climate-related Financial Disclosures — framework for reporting climate risks and opportunities. Now incorporated into ISSB standards.
- **Verifiable Credential (VC)** — A tamper-evident digital credential issued by a trusted authority, held in a wallet, and presented to verifiers. Core of SSI.
- **Voluntary Carbon Market** — Market where companies and individuals buy carbon credits voluntarily to offset emissions, outside of regulatory mandates.
- **Weak Signal** — An early indicator of a potentially important future trend that is not yet mainstream. Requires monitoring without overcommitting.
- **ZKP** — Zero-Knowledge Proof — cryptographic method allowing one party to prove a statement is true without revealing any information beyond the statement's validity.