FLASHFEED STUDY GUIDE

Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better

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Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better: unofficial study guide

Lyn Alden traces money from gold's rise as a ledger asset through the telegraph's speed gap, the collapse of the gold standard, and the Cantillon effect of fiat credit, to Eurodollar and petrodollar hegemony and Bitcoin's proof-of-work scarcity.

Unofficial study guide for *Broken Money: Why Our Financial System is Failing Us and How We Can Make it Better* by Lyn Alden. FlashFeed is not affiliated with the author or publisher.

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How to use this guide

Take one lesson at a time: read the study guide, then go over any key facts. Where a lesson has a self-test, try it from memory before you check the answer key at the back. Follow the Go deeper links when you want more.

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LESSON 1 OF 7

Lesson 1: The Ledger Theory and Genesis of Money

1.1 Money as a Social Ledger · 1.2 The Triumph of Monetary Gold

WHAT YOU'LL BE ABLE TO DO

- Explain how money functions as a social ledger, from clay tablets and glass-bead trade to bearer assets, saleability, and custodial risk.
- Explain why gold's scarcity, durability, and stable classical standard made it the dominant form of money over silver.

Monograph Section: Lesson 1 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Explores the fundamental definition of money as a social ledger, dismantles the traditional barter myth, examines historical commodity monies from Yapese Rai stones to cowrie shells, and analyzes why gold's high stock-to-flow ratio and physical properties established it as humanity's premier monetary base.

Money as a Social Ledger

Conceptual Foundations: Ledger Theory of Money, Double Coincidence of Wants, Credit-First Historical Origin, Yapese Rai Stones

Core Insight: Money is fundamentally a technology for maintaining a social ledger that tracks who has provided value to others and who is owed value in return.

Lyn Alden frames money not as an arbitrary physical object, but as an informational record-keeping system. Every monetary medium—from ancient clay tablets to physical coins and digital tokens—serves as an accounting tool to coordinate social cooperation across time and space.

Core Insight: The classical economic myth of a pure barter economy precedes historical reality, as anthropological evidence demonstrates that early human communities relied primarily on informal credit and reciprocal social ledgers.

Adam Smith's traditional textbook narrative that barter naturally gave rise to money is historically inaccurate. Early societies operated through informal debt accounting and reciprocal trust within communities, resorting to spot barter only when trading with unfamiliar or hostile external tribes.

Core Insight: Direct barter fails to scale in complex societies due to the double coincidence of wants, where two transacting parties must simultaneously desire each other's specific commodities.

Without a common medium of exchange, trade is crippled by search costs. If a baker needs shoes and a cobbler needs wheat, a transaction cannot occur unless intermediate trades are executed, severely

limiting specialization and division of labor.

Core Insight: The giant limestone Rai stones of Yap island prove that physical transfer is unnecessary for money to function as long as communal consensus over the ledger is maintained.

The people of Yap used massive, immobile stone discs quarried hundreds of miles away. Ownership was tracked orally through social consensus. When one stone sank during maritime transport, the community agreed the wealth still existed and continued trading title to it, illustrating the pure ledger nature of money.

Core Insight: Mesopotamian clay cuneiform tablets represent some of humanity's earliest preserved monetary records, functioning as centralized temple ledgers to track grain obligations and labor credits.

In ancient Sumer and Babylon, temples and palaces maintained balance sheets on clay tablets. Silver was used as a conceptual unit of account to measure debts, while actual day-to-day transactions and wages were cleared in barley recorded on the centralized temple ledger.

Core Insight: Nick Szabo defined unforgeable costliness as the essential property requiring significant expenditure of scarce resources to produce a monetary asset, preventing arbitrary supply debasement.

If a monetary item can be created effortlessly, early producers will hyper-inflate the supply to extract purchasing power from holders. Throughout history, items like rare shells, glass beads, and precious metals succeeded because their production could not be faked or easily expanded.

Core Insight: When European traders introduced cheap industrially manufactured glass beads to West Africa, they collapsed local bead-based currencies and extracted massive real wealth from indigenous populations.

Aggry beads had served as hard money in West Africa for centuries due to difficult local artisanal production. European merchants manufactured identical glass beads cheaply in Venice and Amsterdam, flooded African markets, and bought up land, resources, and enslaved people, destroying the local monetary ledger.

Core Insight: Money serves three classical functions: a medium of exchange, a store of value across time, and a common unit of account for pricing goods.

An asset typically monetizes in stages: first emerging as a collectible or store of value, evolving into a widely accepted medium of exchange as liquidity deepens, and finally becoming the numeraire or unit of account in which debt contracts and goods are priced.

Core Insight: Bearer assets are unique financial instruments because possession of the physical asset itself constitutes final settlement without requiring trust in a third-party ledger keeper.

Unlike debt-based ledger entries (such as modern bank deposits), physical gold, silver, or physical cash in hand do not represent an IOU or liability of another institution. Final settlement occurs immediately upon physical transfer.

Core Insight: The primary weakness of centralized ledger systems is custodial abuse, where the entity controlling the ledger alters balances, issues unbacked claims, or excludes participants.

Whenever a society delegates ledger keeping to a centralized authority—whether a monarch, temple, or modern commercial banking system—the custodian inevitably faces incentives to inflate the ledger to fund deficits or enrich insiders at the expense of general participants.

Core Insight: Cowrie shells served as one of the most widely circulated primitive commodity currencies across Asia and Africa due to their natural durability, uniform size, and geographic scarcity.

Cowrie shells possessed superior monetary properties compared to perishable goods. However, their monetary status collapsed once modern transportation allowed mass harvesting and importation from regions where they were plentiful (such as the Maldives) to regions where they were scarce.

Core Insight: The saleability of an asset across scale, space, and time determines its competitiveness and likelihood of emerging as money in a free market.

Menger's market theory of money shows that individuals naturally hoard and trade for goods with the highest liquidity and lowest transaction friction, creating a positive feedback loop that converges on one or two dominant monetary assets.

Core Insight: Fungibility is the monetary property whereby each individual unit of a good is completely interchangeable with any other unit of equal denomination.

Commodities like pure gold or silver are highly fungible because melting and refining restores uniform purity. In contrast, commodities like livestock, diamonds, or art lack perfect fungibility due to variations in quality, limiting their ability to serve as broad media of exchange.

Core Insight: Divisibility enables a monetary asset to be partitioned into smaller fractions without destroying its aggregate value, facilitating both micro-purchases and large-scale capital accumulation.

Precious metals can be cut, minted into small coins, or melted back together without losing their intrinsic material worth. Conversely, dividing an animal or gem drastically reduces or destroys its utility.

Core Insight: The fundamental tension in monetary history is the trade-off between the hardness of a bearer asset and the velocity and convenience of a ledger system.

Physical gold provided unforgeable scarcity and sovereign settlement, but transferring tons of gold across oceans was slow and dangerous. Ledger credit moved swiftly but required trusting intermediaries, setting the stage for monetary centralization.

The Triumph of Monetary Gold

Conceptual Foundations: Stock-to-Flow Ratio, Chemical Inertness and Durability, Hardness vs Softness of Money, Lydian Coinage Invention

Core Insight: Gold triumphed as humanity's primary monetary metal because its high stock-to-flow ratio makes its existing supply virtually immune to dramatic annual production dilution.

Because virtually all gold mined across thousands of years remains intact due to its non-corrosive nature, annual new production adds only 1% to 2% to the global stock. This prevents miners from

significantly diluting the purchasing power of existing holders, making gold exceptionally 'hard' money.

Core Insight: The stock-to-flow ratio is calculated by dividing total accumulated existing inventory (stock) by the annual new production (flow), measuring an asset's resistance to supply inflation.

Consumer commodities (like wheat, oil, or copper) have low stock-to-flow ratios (often less than 1) because they are consumed quickly. Precious metals, particularly gold (with a ratio often exceeding 50 to 60), maintain persistent high ratios because they accumulate without decomposing.

Core Insight: Chemically, gold is the most noble and unreactive metal on the periodic table, preventing corrosion, rust, oxidation, or degradation across millennia.

If iron or copper is buried, it degrades into rust and verdigris. Gold extracted from ancient Roman shipwrecks or Egyptian tombs emerges in pristine, unblemished condition, satisfying the ultimate requirement for temporal store of value.

Core Insight: The invention of standardized stamped coinage in 7th-century BCE Lydia revolutionized commerce by eliminating the need to weigh and assay precious metals for every individual transaction.

Before coinage, trading gold or silver required scales and chemical testing for purity. By stamping standardized designs and weight marks onto coins, King Alyattes and King Croesus created a frictionless unit of exchange that spread across the Mediterranean.

Core Insight: Gresham's Law states that bad money drives out good money from circulation whenever the state legally fixes their exchange rate below market reality.

If a government decrees that debased coins with less gold content must be accepted at par with pure gold coins, rational individuals will hoard or melt down the pure coins and spend the debased coins, causing good money to vanish from active commerce.

Core Insight: Silver served as the practical daily transactional money for ordinary commerce, while gold functioned as the high-value reserve asset for large wholesale settlements.

Because gold was too dense in value—a tiny grain of gold was worth a week's supply of food—it was impractical for buying bread or tools. Silver bridged this gap by providing an intermediate density suited for retail commerce.

Core Insight: Bimetallic monetary systems suffered chronic instability due to fluctuating market supply ratios between gold and silver that conflicted with legally mandated fixed mint ratios.

Whenever new silver strikes occurred (such as the Comstock Lode in Nevada), market silver prices dropped below the legal ratio, causing gold to be exported and silver to flood the domestic economy, creating monetary instability.

Core Insight: The British Empire's de facto adoption of the single gold standard in 1717, initiated by Sir Isaac Newton's overvaluation of the gold guinea relative to silver, catalyzed global gold standardization.

Newton's miscalculation caused silver to leave Britain for continental Europe where it commanded higher value. Britain adapted to operating solely on gold, and as the British Empire became the preeminent 19th-century trade power, the rest of the world followed onto gold.

Core Insight: The Industrial Revolution dramatically expanded silver extraction through steam-powered mining and chemical refining, collapsing silver's stock-to-flow ratio and causing its global demonetization.

As industrialized mining caused massive silver inflation, major nations including Germany (1871), the United States (1873 Coinage Act), and the **Latin Monetary Union** (which limited and then suspended silver coinage in the 1870s) moved toward a de facto gold standard.

Core Insight: Gold possesses exceptionally high value density, enabling substantial wealth to be stored and transported in compact physical volumes.

A single standard 400-ounce gold bar weighs approximately 27 pounds but holds on the order of a million dollars or more at recent gold prices, making physical storage in secure vaults feasible for sovereign states and private institutions.

Core Insight: Gold mining exhibits severe diminishing marginal returns, ensuring that sudden surges in gold prices do not lead to massive proportional increases in total global supply.

Unlike manufactured goods where higher prices trigger immediate factory expansion, gold's crustal rarity and difficult extraction guarantee supply inelasticity, protecting holders against sudden hyper-inflationary supply shocks.

Core Insight: The Latin Monetary Union, founded in 1865 by France, Belgium, Italy, and Switzerland, represented an early multinational attempt to standardize bimetallic coin weights across European borders.

While successful initially in harmonizing currency specifications, member states printed excessive paper bank notes that were ostensibly redeemable in coins, and fluctuating silver prices ultimately dissolved the monetary union.

Core Insight: The primary physical limitation of gold as a monetary medium is its slow velocity and high physical transport friction across long geographic distances.

Settling international gold debts required shipping heavy crates of bullion on armed vessels, paying steep insurance premiums, and enduring weeks of transit time, creating a spatial bottleneck in an increasingly globalized economy.

Core Insight: Monetary hardness refers to the difficulty of producing new units of an asset relative to its existing supply, whereas softness indicates ease of production dilution.

When an asset is easy to create (soft), human society naturally produces excess quantities until its marginal production cost equals its exchange value, destroying its monetary premium. Gold retained its premium because physical chemistry made it permanently hard.

Core Insight: By the late 19th century, the global classical gold standard created an integrated international monetary network characterized by stable exchange rates, fiscal discipline, and low inflation.

With major currencies (Pounds, Dollars, Francs, Marks) directly pegged to fixed weights of gold, exchange rate risk was minimized, governments faced hard budget constraints, and global price levels remained remarkably stable across decades.

Key terms

Unforgeable Costliness

The requirement that a monetary asset must require significant, unavoidable expenditure of scarce physical resources to create, preventing arbitrary supply inflation.

Fungibility

The property of a monetary good where every individual unit is completely equivalent and interchangeable with any other unit of equal denomination.

Stock-to-Flow Ratio

The mathematical ratio of accumulated existing inventory (stock) divided by annual new production (flow), measuring an asset's resistance to supply inflation.

Key facts

> **Barter Myth vs. Anthropological Reality**
>
> Classical Barter Myth — Textbooks claim economies began with spot barter of goods.
>
> Anthropological Reality — Historical evidence shows communities operated through informal credit and reciprocal social ledgers.



Eric Guinther · CC BY-SA 3.0

Yapese Rai Stones

Massive limestone discs whose ownership is maintained via communal oral consensus, proving physical possession is secondary to social ledger agreement.



Gary Todd from Xinzheng, China · CC0

Cowrie Shell Monies

Ancient commodity money across Africa and Asia whose monetary status collapsed when modern transport enabled mass importation from abundant coastal regions.



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Gresham's Law

Economic principle stating that undervalued sound money is hoarded and driven out of circulation when legal tender laws fix parity with overvalued debased money.

> **Silver vs. Gold: Transactional Roles**
>
> Silver Coinage — Served as the everyday medium for retail purchases due to its practical value density.
>
> Gold Bullion — Served as high-value institutional reserve money for large-scale settlements.



Петров Эдуард · CC0

Latin Monetary Union (1865)

Multinational European monetary treaty that standardized gold and silver coin weights across member states, but ultimately collapsed under unbacked paper issuance.

Matched pairs

Each item on the left goes with the one on the right.

Unit of Account
→ Common baseline numeraire for pricing goods, calculating profits, and denominating debts.

Divisibility → Enables partitioning into precise fractional units without destroying aggregate value.

Sir Isaac Newton (1717)
→ Inadvertently undervalued silver at the Royal Mint, causing silver flight and a de facto gold standard.

Step by step

Identify the sequential economic steps that prevent sudden surges in gold prices from triggering hyper-inflationary supply spikes.

1. Market demand surges and drives the spot price of gold significantly higher.
2. Mining corporations allocate capital to explore and permit low-grade geological deposits.
3. Years of capital-intensive excavation and chemical ore refining yield only marginal new ounces.
4. Total annual new production expands global stockpiles by merely 1.5% to 2%, preserving hardness.

Self-test

Answer each question from memory, then check your work against the answer key.

1. A baker needs shoes and a cobbler needs wheat but not from each other. What trade barrier does this illustrate?

- A Tragedy of the commons
- B Double coincidence of wants
- C Asymmetric information problem
- D Principal-agent problem

2. What term describes a centralized ledger's administrator unilaterally debasing, freezing, or confiscating balances?

- A Bank run
- B Gresham's Law
- C Custodial abuse
- D Double spending

3. A Yapese Rai stone sank during transport at sea. What did the community do about its ownership?

- A Kept recognizing ownership by oral consensus
- B Split ownership among all villagers
- C Declared the stone's value void
- D Required a replacement stone be quarried

4. Who defined 'unforgeable costliness' as the property requiring real resource expenditure to create a monetary asset?

- A Carl Menger
- B Adam Smith
- C Milton Friedman
- D Nick Szabo

5. Which of these is NOT one of the three classical functions of money?

- A Unit of account
- B Medium of exchange
- C Standard of deferred payment
- D Store of value

6. What does an asset's stock-to-flow ratio measure?

- A Total supply divided by circulating supply
- B Price divided by annual earnings
- C Market cap divided by trading volume
- D Existing stock divided by annual new production

7. Which metal served as the everyday medium for retail purchases while gold served as institutional reserve money?

A Palladium
B Silver
C Platinum
D Copper

8. Which property of gold explains why coins recovered from ancient shipwrecks remain uncorroded after centuries underwater?

A Chemical inertness (nobility)
B High melting point
C High density
D High electrical conductivity

9. Under Gresham's Law, when legal tender laws fix an overvalued debased coin at par with sound money, what happens?

A Sound money becomes the only currency used
B Both coins circulate equally forever
C Sound money is hoarded and leaves circulation
D Debased money is hoarded instead

10. What did Sir Isaac Newton do as Master of the Royal Mint in 1717 that led to a de facto gold standard in England?

A Banned silver coinage entirely
B Fixed gold below its market value
C Introduced a bimetallic ratio favoring silver
D Inadvertently undervalued silver at the Mint

Go deeper

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LESSON 2 OF 7

Lesson 2: The Speed Gap and Banking Centralization

2.1 The Telegraph and the Speed Gap · 2.2 Fractional Reserve and Custodial Power

WHAT YOU'LL BE ABLE TO DO

- Explain how the telegraph's speed gap between information and physical gold drove vault centralization and bank runs.
- Explain how the Bank of England, the Fed, and FDIC insurance grew from fractional-reserve banking to backstop it and create moral hazard.

Monograph Section: Lesson 2 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Analyzes how the invention of the electric telegraph in the 1840s decoupled the speed of financial information from the physical movement of gold, creating the systemic 'speed gap'. Explores how paper claims, custodial gold concentration in bank vaults, fractional reserve banking, and central bank lender-of-last-resort mechanisms centralized monetary power.

The Telegraph and the Speed Gap

Conceptual Foundations: The Speed Gap Thesis, Decoupling Information from Matter, Telegraphic Wire Transfers, Transatlantic Cable 1866

Core Insight: The invention of the electric telegraph in the 1840s decoupled the transmission speed of financial information from the physical transport speed of matter for the first time in human history.

Prior to telecommunications, sending a payment instruction across the Atlantic took weeks by ship—the exact same duration required to physically transport gold bullion. The telegraph shattered this parity, allowing ledger updates to occur in seconds across continents.

Core Insight: The 'speed gap' is the fundamental divergence between instantaneous digital communication of financial claims and the sluggish physical settlement of underlying bearer commodities.

As global trade accelerated, merchants demanded instant cross-border settlement. Because physical gold could not travel through copper wires, commerce increasingly relied on electronic messages adjusting balances on centralized bank ledgers.

Core Insight: The completion of the permanent transatlantic telegraph cable in 1866 permanently synchronized London and New York financial markets into a single high-velocity network.

Instant communications eliminated price discrepancies between European and American exchanges, cementing London as the world's clearinghouse and vastly accelerating the volume of paper claims circulating against physical reserves.

Core Insight: To resolve the speed gap, human commerce increasingly substituted secondary paper claims and bank ledger entries in place of physical gold coin circulation.

Carrying heavy gold coins to settle international trades became commercially obsolete. Instead, banks issued paper banknotes and deposit receipts that could be traded rapidly, while gold stayed locked in secure subterranean vaults.

Core Insight: Western Union initiated commercial telegraphic money transfers in 1871, establishing the prototype for modern electronic funds transfer and wire clearing systems.

Western Union proved that customers cared far more about transaction speed and geographic reach than holding physical bearer assets, shifting consumer behavior toward centralized ledger networks.

Core Insight: The speed gap incentivized the physical centralization of gold into large commercial and central bank vaults to facilitate local internal ledger reconciliation.

When two counterparties used the same bank or clearinghouse, settling a multi-million-dollar transaction required only debiting one ledger column and crediting another, eliminating the need to physically shift gold bars.

Core Insight: As physical gold became abstracted behind layers of paper receipts and wire transfers, consumers increasingly mistook the paper claim for the money itself.

When generations grew up using paper banknotes daily without ever redeeming them for physical gold coin, the cultural understanding of money shifted from an unforgeable physical commodity to a government-sanctioned paper ledger.

Core Insight: Centralized clearinghouses like the London Bankers' Clearing House and New York Clearing House emerged to net out interbank liabilities without physical bullion movement.

Netting reduced the physical movement of money by over 95%. Banks transferred small quantities of gold or clearinghouse certificates at the end of each business day to reconcile aggregate liabilities, cementing institutional interdependence.

Core Insight: The speed gap created a profound structural asymmetry: while transactions occurred at the speed of light, dispute resolution and bank run redemptions remained limited to the speed of physical transport.

A bank could receive telegraphic withdrawal demands that completely overwhelmed its local vault reserves, even if the bank held ample physical gold assets located in a distant branch or sovereign vault.

Core Insight: Telecommunications transformed local banking networks into deeply interconnected national and international webs subject to rapid contagion during financial panics.

A failure of an agricultural bank in Chicago or a cotton merchant in New Orleans could trigger an instantaneous liquidity contraction in New York and London within hours via telegraphic margin calls.

Core Insight: The divergence of transaction velocity from settlement velocity laid the technical foundation for the eventual abandonment of the gold standard.

Once the global economy adapted to operating entirely on paper and electronic claims, governments realized that the physical gold backing was an administrative constraint that could be suspended during crises without halting daily retail commerce.

Core Insight: Under a physical gold regime, final settlement is achieved when physical metal changes hands, leaving no residual counterparty liability or credit obligation.

Unlike modern payment cards or bank transfers—which can be reversed, frozen, or default within clearing windows—physical bearer settlement is atomic, final, and free from custodial solvency risk.

Core Insight: The Bank Charter Act of 1844 in the United Kingdom attempted to restrict paper banknote issuance to exact gold backing, but failed to regulate commercial bank deposit creation.

While Parliament successfully regulated physical paper notes, banks simply shifted to granting customers checkable deposit accounts and ledger credits, allowing fractional reserve credit expansion to continue unhindered.

Core Insight: Telecommunications enabled the emergence of multinational banking conglomerates that could manage balance sheets across dozens of sovereign jurisdictions simultaneously.

Institutions like the House of Rothschild, Barings Bank, and J.P. Morgan used private telegraphic codes to coordinate sovereign lending, gold arbitrage, and commodity financing across the British Empire and the Americas.

Core Insight: The ultimate consequence of the 19th-century telecommunications revolution was shifting the locus of monetary power from individual asset holders to centralized ledger gatekeepers.

When commerce was physical, individuals possessed sovereign bearer money. When commerce became telegraphic, individuals became dependent on bank permissions, wire operators, and government-chartered clearinghouses to conduct economic life.

Fractional Reserve and Custodial Power

Conceptual Foundations: Fractional Reserve Banking, Maturity Mismatch, Bank Run Mechanics, Lender of Last Resort

Core Insight: Fractional reserve banking occurs when a financial institution holds only a fraction of its total customer deposit liabilities as physical reserves in vault, lending out the remainder.

If a bank receives 100 gold coins on deposit and lends out 90 coins to a borrower, both the original depositor and the borrower's counterparty hold claims to spend money, expanding the broad money supply through ledger credit.

Core Insight: Maturity mismatch is the structural banking vulnerability of financing long-term illiquid loans (like mortgages and business credit) using short-term, instant-demand customer deposits.

Depositors expect to withdraw their money on any given morning. However, the bank's assets are tied up in five-year commercial loans or thirty-year mortgages, making it mathematically impossible to satisfy simultaneous mass redemption requests.

Core Insight: A bank run is a self-fulfilling panic where depositors rush to withdraw their funds simultaneously before the institution's fractional cash reserves are completely exhausted.

Because a fractional bank cannot liquidate its long-term loan book instantly without catastrophic fire-sale losses, even a solvent bank with solid long-term loans will collapse into immediate bankruptcy if depositors lose confidence.

Core Insight: Walter Bagehot formulated Bagehot's Dictum in 1873, advising central banks during panics to lend freely, at a high penalty interest rate, against good collateral.

Bagehot argued that withholding liquidity during a panic causes widespread solvency cascades. By lending freely against sound collateral, the central bank quells panic while the high penalty rate prevents banks from abusing emergency facilities.

Core Insight: The establishment of central banks created a government-backed cartel that socialized the liquidity risk of private commercial fractional reserve banks.

Without a central bank, reckless fractional reserve banks went bankrupt and were eliminated by market discipline. Central banks provided emergency rediscount windows, ensuring that member banks could always obtain paper cash reserves during runs.

Core Insight: Moral hazard arises in banking when institutions take excessive, high-yield risks because they know profits are privatized to shareholders while catastrophic losses are backstopped by the public.

When bank executives and shareholders know that the central bank or taxpayers will rescue the institution during a crisis, they have strong financial incentives to minimize capital reserves and maximize leverage to boost quarterly returns.

Core Insight: The Federal Reserve Act of 1913 was enacted primarily to provide an 'elastic currency' capable of expanding during panics and crop harvest seasons to prevent banking liquidity panics.

Prior to 1913, the US money supply was restricted by the availability of gold and government bonds, leading to seasonal cash crunches during autumn harvest when farmers demanded physical currency. The Fed was granted the legal power to discount commercial paper into newly issued Federal Reserve Notes.

Core Insight: Pyramiding of reserves occurred under the National Banking System when regional banks deposited their legal reserves in larger New York reserve city banks, concentrating systemic risk on Wall Street.

When rural banks faced seasonal crop demands, they recalled their deposits from New York banks. New York banks, which had lent those funds into volatile stock market call-loan markets, were forced to liquidate margin loans, triggering stock crashes and banking panics.

Core Insight: The money multiplier model describes the theoretical process where an initial deposit of base money expands into a larger total money supply through successive rounds of bank lending.

With a 10% reserve requirement, an initial 100 gold or central bank deposit can theoretically support up to 1,000 in total bank deposits across the financial system as funds are repeatedly deposited, partially lent, and redeposited.

Core Insight: Deposit insurance schemes, such as the Federal Deposit Insurance Corporation (FDIC) created in 1933, permanently eliminated depositor discipline by making retail customers indifferent to a bank's risk profile.

Before the **FDIC**, consumers actively researched bank solvency and avoided risky lenders. Government guarantees shifted the regulatory burden entirely onto state agencies while encouraging banks to compete on interest rates rather than safety.

Core Insight: Under fractional reserve banking, bank deposits are legally unsecured creditor claims against the bank, not bailment assets held in safe custody.

When an individual deposits funds, the money legally becomes the bank's property on its asset ledger, while the depositor receives an IOU. If the bank fails, the depositor is legally an unsecured creditor subject to bankruptcy hair-cuts.

Core Insight: The Bank of England, established in 1694 as a private corporation to fund King William III's naval war against France, established the prototype for the modern central banking alliance.

In exchange for loaning £1.2 million in gold to the British Crown, the **Bank of England** received the exclusive legal privilege of issuing legal tender banknotes and managing government debt, formalizing the symbiotic state-central bank nexus.

Core Insight: Clearinghouse loan certificates were emergency private scrip issued by banking associations during 19th-century panics to settle interbank claims when physical gold was hoarded.

Clearinghouse certificates represented an early, private-market precursor to central bank emergency lending facilities, allowing banks to settle mutual accounts without exhausting their precious vault cash.

Core Insight: The creation of central banking and deposit insurance permanently separated the risk of monetary expansion from individual commercial bank failure, institutionalizing structural inflation.

In a hard money system without central backstops, over-expansion resulted in swift deflationary cleansing of bad debt. The central bank framework ensured that debt crises were consistently resolved by creating more base money, institutionalizing long-term currency debasement.

Core Insight: By centralizing ledger authority, the modern fractional reserve system replaced decentralized, market-determined hard money with a politically managed credit hierarchy.

What began as individual gold coins held in sovereign custody transformed into a multi-tiered financial pyramid: central bank reserves at the base, commercial bank deposits in the middle, and derivative financial claims at the apex.

Key terms

The Speed Gap

The vast temporal divergence between instantaneous electronic communication of financial claims and the slow physical delivery of underlying bearer money.

Settlement Finality

The precise condition where a payment is irrevocable, unconditional, and completely extinguishes all counterparty claims and liabilities.

Fractional Reserve Banking

The banking practice of holding only a fraction of customer demand deposit liabilities as liquid reserves, lending out the remainder to expand credit.

Moral Hazard in Banking

The distortion where banks take excessive leverage and risks because profits accrue to private shareholders while catastrophic downside losses are backstopped by the state.

Key facts



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Western Union Wire Transfers (1871)

The first commercial electronic money transfer service, proving that consumer commerce prioritized speed and convenience over holding physical bearer assets.



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Compare Regional Banking Before and After the Telegraph

Isolated regional banks once contained local panics on their own. Telegraphic integration linked those banks into a single high-speed network, so a panic in one hub could spread as synchronized, systemic contagion across the whole financial system almost instantly.

> **Monetary Gatekeeping Shift**
>
> The structural migration of monetary sovereignty from individual citizens holding physical gold coins to institutional custodians controlling electronic ledger networks.

> **Reserve Pyramiding**
>
> 19th-century US banking mechanism where rural banks deposited reserves in Wall Street banks, concentrating systemic liquidity risks in stock market call loans.

> **Contrast the legal reality of a commercial bank deposit with a property bailment**
> A property bailment leaves legal title with the owner even while a bank holds it in safe custody. A commercial bank deposit is different: the money legally becomes the bank's property, and the depositor becomes only an unsecured creditor with a claim against the bank.

> **Clearinghouse Loan Certificates**
> Private emergency scrip issued by banking associations during 19th-century panics to settle interbank claims when physical gold cash was drained.

Matched pairs

Each item on the left goes with the one on the right.

Paper Banknote → A circulating debt claim or IOU redeemable for underlying bearer money.

Money Multiplier
→ The ratio representing how base reserves expand into broader deposit money through credit.

Step by step

Outline the dynamic progression of a self-fulfilling bank run under fractional reserve banking.

1. Depositors perceive or fear that a bank's illiquid assets or solvency are impaired.
2. Rational depositors rush to withdraw their cash on demand before fractional reserves deplete.
3. The bank runs out of vault cash and is forced to fire-sale illiquid loans at massive losses.
4. Insolvency is realized and the bank closes its doors, leaving late depositors with total losses.

Self-test

Answer each question from memory, then check your work against the answer key.

1. In what decade was the electric telegraph invented, decoupling financial information speed from physical gold transport?

- A 1880s
- B 1860s
- C 1840s
- D 1820s

2. What year was the permanent transatlantic telegraph cable completed, syncing London and New York markets?

- A 1858
- B 1866
- C 1884
- D 1871

3. A bank holds ample gold in a distant vault, but telegraphic withdrawal demands overwhelm the local branch's reserves. This best illustrates:

A) The money multiplier effect
B) Moral hazard in banking
C) Fractional reserve banking
D) The speed gap's transaction-settlement asymmetry

4. Which of these is NOT a function of 19th-century centralized clearinghouses like the London Bankers' Clearing House?

A) Providing deposit insurance to account holders
B) Netting interbank liabilities without moving bullion
C) Reducing physical gold transfers by over 95%
D) Reconciling liabilities via loan certificates

5. Which company pioneered commercial telegraphic money transfers in 1871?

A) Western Union
B) New York Clearing House
C) House of Rothschild
D) Bank of England

6. What is fractional reserve banking?

A) Issuing loans only against government bonds
B) Holding all deposits as reserves at all times
C) Backing all currency with physical gold coin
D) Holding a fraction of deposits, lending the rest

7. What year was the Bank of England chartered as a private corporation to finance a war against France?

A) 1913
B) 1971
C) 1694
D) 1844

8. Legally, what is a depositor's claim on money placed in a commercial bank account?

A) Co-ownership shared with other depositors
B) Unsecured creditor claim against the bank
C) Full ownership title, as in a bailment
D) A secured claim backed by collateral

9. What term describes banks taking excessive risk because profits are private but losses are backstopped by the state?

A) Reserve pyramiding
B) Credit pyramid apex
C) Money multiplier
D) Moral hazard

10. Which of these is NOT one of the risk-concentrating mechanisms tied to fractional reserve and custodial banking?

A) Multilateral netting
B) Reserve pyramiding
C) Moral hazard from state backstops
D) Money multiplier expansion

Go deeper

ONLINE This lesson on the web flashfeedlearningapp.com/study-guides/broken-money/lesson-2-the-speed-gap-and-banking-centralization

STUDY Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better in the FlashFeed app flashfeedlearningapp.com/packs/broken-money

LESSON 3 OF 7

Lesson 3: War, Defaults, and the Fall of the Gold Standard

3.1 The Collapse of Classical Convertibility · 3.2 Bretton Woods to the Nixon Shock

WHAT YOU'LL BE ABLE TO DO

- Explain how WWI financing and the flawed interwar gold-exchange standard collapsed classical gold convertibility by 1933.
- Explain how the Bretton Woods dollar-gold peg and its dollar overhang led to Nixon's 1971 closing of the gold window.

Monograph Section: Lesson 3 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Chronicles the dramatic unravelling of the classical gold standard during World War I, the monetary chaos of the interwar years, the Weimar hyperinflation, Roosevelt's Executive Order 6102 gold confiscation, the 1944 Bretton Woods agreement establishing the US Dollar gold-exchange standard, Robert Triffin's structural paradox, and Richard Nixon's historic closing of the gold window on August 15, 1971.

The Collapse of Classical Convertibility

Conceptual Foundations: World War I Gold Suspension, War Finance and Inflation, Weimar Hyperinflation 1923, Gold Exchange Standard Flaws

Core Insight: Within days of the outbreak of World War I in August 1914, all major European belligerent nations suspended domestic gold convertibility to finance military mobilization through unconstrained paper money printing.

Financing total war through direct taxation was politically untenable. By closing the gold window and forcing citizens to accept paper notes, governments extracted wealth silently through inflation, demonstrating that paper gold pegs are always abandoned during sovereign existential crises.

Core Insight: The United Kingdom attempted to return to the gold standard in 1925 under Chancellor Winston Churchill at the pre-war parity of $4.86 per pound, triggering severe domestic deflation, wage cuts, and a general strike.

Because Britain had doubled its paper money supply during the war, attempting to restore the 1914 gold price required massive economic contraction to force prices and wages down, leading to the UK's ultimate, permanent abandonment of gold in September 1931.

Core Insight: The Weimar Republic hyperinflation of 1923 completely destroyed the German mark, demonstrating that hyperinflation is a mathematical feedback loop driven by total collapse in currency confidence.

Faced with crushing Versailles reparations and French occupation of the Ruhr, the Reichsbank monetized debt by operating printing presses around the clock. At the peak, prices doubled every two days, wiping out the entire German middle-class savings.

Core Insight: The interwar Gold Exchange Standard adopted at the 1922 Genoa Conference was inherently unstable because central banks held paper pounds and dollars as reserves alongside gold, creating a multi-tiered pyramid of leverage.

Instead of holding physical bullion, peripheral nations held interest-bearing sterling and dollar deposits that were ostensibly convertible into gold. When Britain defaulted in 1931, the entire international reserve pyramid collapsed.

Core Insight: On April 5, 1933, US President Franklin D. Roosevelt signed Executive Order 6102, making private ownership and hoarding of monetary gold coin, bullion, and certificates illegal for American citizens.

Faced with widespread bank runs and gold outflows during the Great Depression, the US government confiscated the sovereign hard money of its population to prevent citizens from protecting their wealth from impending state devaluation.

Core Insight: The Gold Reserve Act of January 1934 officially devalued the US dollar by 41%, unilaterally revaluing the statutory price of gold from 20.67 to 35.00 per troy ounce.

By devaluing the dollar against gold, the Roosevelt administration engineered artificial inflation to boost commodity prices and reduce real debt burdens, while transferring all physical gold from the Federal Reserve System directly to the US Treasury.

Core Insight: Between 1934 and 1974, American citizens were legally prohibited from buying, holding, or trading monetary gold bullion, transforming the US dollar domestically into pure irredeemable paper.

While foreign central banks could still theoretically redeem dollars for gold at the official $35 rate, domestic citizens were forced to use paper Federal Reserve Notes, eliminating market discipline against domestic monetary expansion.

Core Insight: During the 1930s, the United States constructed the United States Bullion Depository at Fort Knox, Kentucky, to store and fortify the confiscated sovereign gold reserves of the nation.

As political turmoil and fascism rose across Europe, foreign governments and investors shipped thousands of tons of gold to the United States for safekeeping, establishing the US as the custodian of the overwhelming majority of global monetary gold.

Core Insight: In September 1931, the United Kingdom abruptly abandoned gold redemption, causing the pound to drop 25% and triggering competitive devaluations across the global economy.

As nation after nation abandoned gold to cheapen their currencies for export advantage, international trade plummeted by over 60%, exacerbated by the Smoot-Hawley Tariff and retaliatory trade wars.

Core Insight: Competitive currency devaluations during the 1930s led to the formation of restrictive currency blocs, such as the British Sterling Area, fracturing the unified global trading system.

Britain created the Imperial Preference system, Germany created bilateral clearing marks for Eastern Europe, and Japan created the Yen bloc. These protectionist monetary walls choked international commerce and fueled militaristic expansionism.

Core Insight: A sovereign default under a paper gold standard occurs when a government breaks its contractual promise to redeem paper certificates for a fixed physical weight of gold.

When governments borrow money with promises of gold convertibility and subsequently devalue or sever the peg, domestic and foreign bondholders suffer a permanent confiscation of real purchasing power.

Core Insight: The classical gold standard acted as an automatic stabilizer for international trade through the price-specie flow mechanism formulated by David Hume in 1752.

If country A ran a trade deficit with country B, gold flowed from A to B. The shrinking money supply in A caused deflation, making its goods cheaper, while B experienced inflation, naturally reversing the trade imbalance without currency manipulation.

Core Insight: By 1944, the United States held over 60% of all above-ground monetary gold reserves in the world, giving it unprecedented leverage to dictate post-war international monetary rules.

Because the US supplied weapons, food, and manufactured goods to the Allied powers in exchange for physical gold bullion throughout the war, it emerged as the sole global superpower with an unshakeable gold-backed balance sheet.

Core Insight: John Maynard Keynes proposed the creation of an international neutral reserve currency called the 'Bancor' at Bretton Woods, but the proposal was rejected by the United States.

Keynes recognized that using a national currency (like the dollar) as the global reserve asset would create structural global imbalances. However, the US used its gold dominance to establish the dollar at the center of the post-war world.

Core Insight: The ultimate lesson of the interwar monetary breakdown is that whenever the state is forced to choose between maintaining gold convertibility and preserving domestic fiscal solvency, convertibility is always sacrificed.

Whether in wartime Britain in 1914, Weimar Germany in 1923, or the United States in 1933, governments consistently prioritized emergency spending, entitlement programs, and debt monetization over the property rights of money holders.

Bretton Woods to the Nixon Shock

Conceptual Foundations: Bretton Woods Agreement 1944, US Dollar Gold-Exchange Standard, Fixed Exchange Rates to USD, Triffin Dilemma Paradox

Core Insight: The Bretton Woods Agreement, established in July 1944 in New Hampshire, constructed a global gold-exchange standard where forty-four Allied nations pegged their currencies to the US dollar at fixed rates, while the US dollar was pegged to gold at $35 per ounce.

This created a two-tiered system: foreign central banks could settle international accounts by redeeming excess dollars for gold from the US Treasury, while private global citizens were excluded from gold redemption.

Core Insight: Under Bretton Woods, the International Monetary Fund (IMF) and the World Bank were created to oversee fixed exchange rates, balance-of-payments crises, and post-war reconstruction.

Member nations were permitted to adjust their exchange pegs only during 'fundamental disequilibrium' with IMF approval, aiming to prevent the destructive competitive devaluations of the 1930s.

Core Insight: The Triffin Dilemma, identified by economist Robert Triffin in 1960, demonstrated that the issuer of the global reserve currency faces a mathematical paradox between providing international liquidity and maintaining gold backing.

If the US ran trade surpluses, the world suffered a dollar liquidity shortage, stalling global trade. If the US ran trade deficits, paper dollar liabilities multiplied until foreign central banks realized the US lacked enough gold to honor redemptions.

Core Insight: By the late 1950s, US paper dollar liabilities held by foreign central banks and private entities officially surpassed the total market value of the US gold reserve at Fort Knox.

As European and Japanese manufacturing recovered and began accumulating massive dollar surpluses, the physical backing behind each paper dollar steadily diluted from 100% to less than 20% by the late 1960s.

Core Insight: The London Gold Pool was established in 1961 by the Federal Reserve and seven European central banks to suppress the free-market price of gold at $35 an ounce through joint open-market intervention.

Rising inflation caused private investors to buy gold above $35. To maintain confidence in the dollar peg, central banks dumped hundreds of tons of sovereign gold onto the private market until speculative buying overwhelmed the syndicate.

Core Insight: The London Gold Pool collapsed in March 1968 after massive private gold buying, catalyzed by the British Sterling devaluation and the Tet Offensive, drained hundreds of tons of central bank gold.

France had already withdrawn from the pool in 1967. When the US and remaining allies lost nearly $3 billion in gold in a few months, they shut down the pool, letting private gold prices rise according to supply and demand.

Core Insight: French President Charles de Gaulle aggressively challenged US monetary hegemony in 1965, deploying French naval ships to transport physical gold redeemed from the US Treasury back to Paris.

De Gaulle realized that the US was exporting its domestic inflation to Europe by printing unbacked paper dollars to acquire European companies and finance the Vietnam War, while Europe had to deliver real goods to earn dollars.

Core Insight: The term 'exorbitant privilege' was coined by French Finance Minister Valéry Giscard d'Estaing to describe the unique US advantage of paying for foreign goods and commodities with self-printed domestic paper currency.

Every other nation had to earn foreign exchange through hard exports before it could import. The United States could simply write checks drawn on its own Federal Reserve ledger, shifting the cost of its deficits onto foreign dollar holders.

Core Insight: The simultaneous escalation of the Vietnam War and Lyndon B. Johnson's domestic 'Great Society' entitlement programs caused massive US fiscal deficits, drastically accelerating dollar inflation.

Federal deficits rose sharply. Rather than reining in spending, the Federal Reserve accommodated Treasury borrowing by expanding the money supply, triggering severe alarm among European central bankers who held billions in depreciating paper.

Core Insight: In early August 1971, the Bank of England and the Bank of France requested billions of dollars in gold redemptions from the US Treasury, threatening to exhaust the remaining US gold reserve.

US gold reserves had dropped from over 20,000 metric tons in 1945 to under 8,500 metric tons in 1971. A complete run on Fort Knox was imminent within days unless the US halted redemptions.

Core Insight: On Sunday evening, August 15, 1971, President Richard Nixon delivered a televised national address announcing that he was 'temporarily' suspending the convertibility of the US dollar into gold.

Nixon met secretly with his top economic advisers at Camp David. To prevent foreign sovereigns from claiming America's remaining gold, he closed the gold window, imposed a 10% import tariff surcharge, and instituted 90-day domestic wage and price controls.

Core Insight: Nixon's 'temporary' suspension of gold convertibility became permanent, casting the entire global economy into a pure unbacked fiat currency experiment for the first time in human history.

In previous eras, individual nations occasionally adopted temporary fiat during wartime, but a global monetary anchor (gold or silver) always remained in the background. Post-1971, all 160+ sovereign currencies became pure fiat ledger entries.

Core Insight: The Smithsonian Agreement of December 1971 attempted to preserve fixed exchange rates by devaluing the dollar to $38 per ounce of gold, but collapsed within fifteen months under relentless currency speculation.

Without the discipline of physical gold redemption, fixed exchange rate pegs between nations with differing inflation rates became impossible to defend against market speculators, inaugurating the modern floating exchange rate regime.

Core Insight: Following the 1971 Nixon Shock, the price of gold in US dollars surged from 35 an ounce to a peak of 850 an ounce by January 1980, reflecting severe global currency debasement.

The 1970s experienced the worst peacetime stagflation in American history. As oil shocks, budget deficits, and monetary expansion compounded, gold exposed the true scale of dollar purchasing power destruction.

Core Insight: The post-1971 fiat system transformed sovereign money from a scarce physical asset into an unconstrained political ledger managed by central bank committees.

Without the hard boundary of gold, central banks gained the unilateral power to create trillions of dollars with a single ledger keystroke, fundamentally changing the nature of saving, capital allocation, and debt cycles worldwide.

Key terms

Domestic Gold Ban (1933–1974)

The four-decade era during which US citizens were legally prohibited from owning monetary gold bullion, transforming domestic money into irredeemable paper.

Price-Specie Flow Mechanism

David Hume's 1752 formulation showing how gold flows naturally rebalance international trade deficits via automatic domestic price adjustments.

The Triffin Dilemma

The structural paradox where the global reserve currency issuer must run persistent balance-of-payments deficits to supply international liquidity, eventually diluting its gold reserves.

Exorbitant Privilege

The unique structural advantage allowing the United States to purchase real foreign goods and commodities by issuing self-printed domestic currency IOUs.

Key facts



John Singer Sargent · Public domain

Churchill's 1925 Parity Blunder

Britain's disastrous return to gold at the pre-war rate ($4.86), which severely overvalued the pound, crushed exports, and caused mass unemployment.

> **1930s Currency Blocs**
>
> Protectionist monetary zones (like the British Sterling Area) that restricted trade to bilateral clearing, choking global commerce and heightening pre-WWII geopolitical tensions.



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Keynes' Bancor vs. the US Dollar Standard

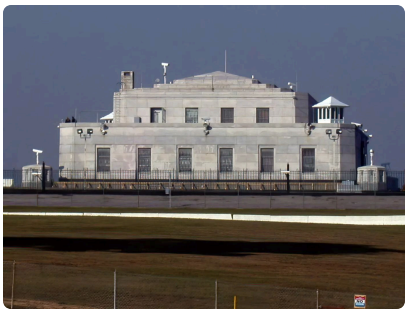
Keynes proposed the Bancor, a neutral supranational reserve unit designed to keep any single nation's currency from dominating world trade and to penalize persistent surpluses or deficits automatically. The US instead used its post-war gold dominance to reject the Bancor, placing its own national currency — the dollar — at the center of Bretton Woods as the world's reserve asset.



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London Gold Pool (1961-1968)

A syndicate of eight Western central banks that dumped sovereign gold onto the private London market to suppress the free-market price at $35 per ounce.



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August 1971 Gold Window Run

The critical sovereign run on Fort Knox by the Bank of England and Bank of France that forced the US to close the gold window before reserves hit zero.

> **Post-1971 Fiat vs. Every Prior Monetary Era**
>
> Earlier eras of paper money always kept some gold or silver anchor in the background, even during wartime suspensions of convertibility. After Nixon closed the gold window in 1971, every major currency on Earth floated as pure, unbacked fiat at the same time — severing that metal anchor for the first time in recorded monetary history.



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Smithsonian Agreement (1971)

Nixon's short-lived agreement devaluing gold to $38 that collapsed within fifteen months, ushering in the modern floating exchange rate regime.

Matched pairs

Each item on the left goes with the one on the right.

Devaluation Default

→ Unilateral breach of contract where the state repays debts in diluted paper rather than agreed gold.

International Monetary Fund

→ Monitors fixed exchange rate pegs and provides emergency bridge loans for payments crises.

Post-1971 Fiat Ledger

→ Governed by discretionary central bank policy committees rather than geological scarcity.

Step by step

Detail the historical sequence of Franklin D. Roosevelt's 1933-1934 gold confiscation and devaluation.

1. President Roosevelt signs Executive Order 6102 on April 5, 1933, criminalizing gold ownership.
2. US citizens are compelled to surrender gold coins and bullion to the Fed at $20.67 per ounce.
3. Congress passes the Gold Reserve Act of January 1934, resetting gold's official price to $35.00.
4. The US Treasury books a 69% windfall on its balance sheet while devaluing the dollar by 41%.

Self-test

Answer each question from memory, then check your work against the answer key.

1. When did major European powers suspend gold convertibility to finance WWI?

- A After the 1918 armistice
- B At the war's second year, 1915
- C Within days of August 1914
- D Gradually during 1916 to 1917

2. At what rate did Churchill return Britain to gold in 1925?

- A $4.86 per pound
- B $5.20 per pound
- C $3.50 per pound
- D $4.00 per pound

3. What made the 1923 Weimar hyperinflation a runaway feedback loop?

- A Wages fell while prices held flat
- B Prices fell as people hoarded cash
- C Prices rose about 10% yearly
- D Prices doubled about every two days

4. What did FDR's Executive Order 6102 (1933) do?

- A Pegged the dollar under Bretton Woods
- B Banned private ownership of monetary gold
- C Created the Federal Reserve System
- D Restored gold at pre-war parity

5. Which was NOT a result of Britain's 1931 abandonment of gold?

- A The pound dropped 25% in value
- B Competitive currency devaluations spread
- C British gold reserves doubled
- D Global trade collapsed by over 60%

6. What system did the 1944 Bretton Woods agreement establish?

- A A single global currency, the Bancor
- B A pure floating fiat currency system
- C A return to the classical gold coin standard
- D A dollar gold-exchange standard at $35 per ounce

7. Per the Triffin Dilemma, why does the reserve currency issuer erode its own gold backing?

- A It must run deficits to supply global liquidity
- B It must impose tariffs on imports
- C It must run surpluses to hoard gold
- D It must raise rates to attract capital

8. By what year did foreign dollar claims exceed the US gold reserve's value?

- A 1971
- B 1959
- C 1944
- D 1965

9. Which is NOT true of the London Gold Pool (1961-1968)?

- A It raised the gold price to lure investors
- B It aimed to defend the $35 gold peg
- C It was a syndicate of eight central banks
- D It sold gold to suppress the market price

10. What forced Nixon to close the gold window on August 15, 1971?

- A The London Gold Pool's 1968 collapse
- B A run on Fort Knox by the UK and France
- C A US decision to nationalize private gold
- D The signing of the Smithsonian Agreement

Go deeper

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LESSON 4 OF 7

Lesson 4: Pure Fiat Mechanics and the Cantillon Effect

4.1 Credit Creation and Base Reserves · 4.2 The Cantillon Effect and Financialization

> **WHAT YOU'LL BE ABLE TO DO**
>
> - Explain how commercial banks create money by lending, and how base reserves differ from broad money (M2).
> - Explain the Cantillon Effect, how new money enriches early recipients first, and how it drives financialization and inequality.

Monograph Section: Lesson 4 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Deconstructs the accounting mechanics of pure fiat currency, how commercial banks create new deposit money ex nihilo through loan origination rather than lending existing savings, the division between central bank base money (M0) and broad money (M2), Richard Cantillon's insight into asymmetric inflation distribution, the financialization of the real economy, and structural wealth inequality.

Credit Creation and Base Reserves

Conceptual Foundations: Endogenous Money Creation, Ex Nihilo Loan Origination, Base Money (M0) vs Broad Money (M2), Bank of England 2014 Clarification

Core Insight: In the modern financial system, commercial banks create the vast majority of broad money (M2) ex nihilo whenever they originate a new loan, rather than acting as mere pass-through intermediaries of existing customer savings.

When a borrower is approved for a $400,000 mortgage, the bank does not take funds from someone else's savings account; it types the credit into the borrower's account as a newly created deposit liability against the mortgage asset.

Core Insight: The Bank of England published a landmark paper in 2014 officially acknowledging that commercial banks create money through credit origination, correcting decades of standard academic textbook models.

Standard economics textbooks taught that banks first collect deposits and then lend a fraction of them out. The **Bank of England** clarified that banks lend first, creating deposits in the process, and subsequently search for reserves in interbank markets to meet regulatory settlement needs.

Core Insight: Monetary aggregates are hierarchically structured into base money (M0), narrow money (M1), and broad money (M2), reflecting different degrees of liquidity and credit expansion.

Base money is the ultimate legal settlement medium issued exclusively by the central bank. Broad money consists of private commercial bank credit IOUs created on top of that base, representing the actual purchasing power used by businesses and consumers.

Core Insight: Central bank reserves are closed-loop digital settlement balances held exclusively by licensed commercial banks at the central bank, which cannot circulate directly in the real economy.

A common misconception is that the Fed 'prints money' directly into retail stores. In reality, the Fed creates reserves that stay on commercial bank balance sheets; money enters the real economy only when commercial banks expand their lending or when the government engages in fiscal deficit spending.

Core Insight: Quantitative Easing (QE) is an asset swap where the central bank creates new reserves to purchase government bonds or mortgage-backed securities mainly from non-bank financial companies, which initially raises the deposits those companies hold (and so broad money) while also creating new bank reserves.

QE lowers long-term interest rates by purchasing bonds and, because the sellers are mostly non-banks, initially raises bank deposits; it does not directly put money into consumers' pockets, and its reach into spending depends on how sellers rebalance their portfolios and how much banks lend.

Core Insight: Direct fiscal deficit spending funded by central bank debt monetization directly expands broad money (M2) in the real economy, leading to rapid consumer price inflation.

Unlike QE (which swaps newly created reserves for existing financial assets), direct government stimulus checks, corporate subsidies, and infrastructure grants inject net-new financial assets directly onto consumer balance sheets, generating swift retail inflation as demonstrated during 2020-2022.

Core Insight: When a bank borrower repays an outstanding loan principal, that broad money is extinguished from the economy, shrinking the total money supply.

Money is created through debt issuance and destroyed through debt repayment. During severe economic recessions, if private borrowers pay down debt faster than banks make new loans, the broad money supply contracts, causing deflationary contractions.

Core Insight: In March 2020, the Federal Reserve officially reduced commercial bank reserve requirement ratios to 0%, eliminating mandatory physical reserves and relying entirely on interest on reserve balances (IORB) and capital adequacy ratios.

Banks are no longer legally required to hold a minimum percentage of customer deposits in reserves. Instead, their lending capacity is constrained by capital adequacy ratios (Tier 1 capital) and liquidity coverage rules under Basel III regulations.

Core Insight: The Federal Reserve's primary policy tool transitioned from open market operations targeting the federal funds rate via scarce reserves to an 'ample-reserves' regime controlling the Interest on Reserve Balances (IORB) and Overnight Reverse Repo (ON RRP) facility.

Because QE flooded the banking system with trillions in excess reserves, the Fed can no longer adjust rates by tweaking tiny reserve volumes. Instead, it pays direct interest on reserves, setting an

administrative floor under money market rates.

Core Insight: Legal tender laws force domestic citizens and courts to accept state-issued fiat paper currency at face value for all public and private debts, legally suppressing market alternatives.

If an individual attempts to contract in gold or alternative currencies, capital gains tax rules and network effects impose friction (private gold-denominated contracts have been legal in the US since 1977), helping the state's fiat dominate within its borders.

Core Insight: Capital gains taxes on gold and alternative currencies create a deliberate barrier to competition, penalizing citizens who attempt to use hard assets as a medium of exchange.

If a citizen buys a cup of coffee with gold or Bitcoin, tax laws treat the transaction as a taxable sale of property, requiring tracking cost basis and paying capital gains taxes on nominal appreciation, creating overwhelming friction against daily use.

Core Insight: Central banks cannot set both the total quantity of money and the price of money (interest rates) simultaneously; attempting to peg interest rates forces them to accommodate whatever money supply is required to maintain the target rate.

If market demand for borrowing increases, the central bank must inject reserves to prevent interest rates from rising above its target. Conversely, if it attempts to fix the money supply, market interest rates fluctuate wildly based on supply and demand.

Core Insight: Shadow banking comprises non-bank financial intermediaries—such as hedge funds, money market funds, and special purpose vehicles—that perform credit transformation outside regular central bank regulatory oversight.

Shadow banking expanded rapidly to bypass bank capital requirements. During the 2008 crash, runs in the shadow banking repo market triggered systemic contagion that forced the Federal Reserve to bail out non-bank Wall Street broker-dealers.

Core Insight: Under a pure fiat regime, inflation is an implicit, unvoted tax on all holders of cash, savings accounts, and fixed-income assets, quietly transferring purchasing power to the sovereign debtor.

Direct taxation requires visible, controversial political debates and legislation. Monetary inflation allows politicians to finance deficit spending invisibly by diluting the currency, disproportionately harming those on fixed incomes and cash wages.

Core Insight: The ultimate endpoint of an unconstrained fiat regime is the debt trap, where sovereign debt grows faster than tax revenues, forcing the central bank to permanently monetize debt and suppress real yields below inflation.

As of the mid-2020s, sovereign debt has climbed into the range of many advanced economies (100%+ of GDP), and raising interest rates to combat inflation risks pushing government interest expense to consume a large and growing share of the federal budget. The central bank must surrender inflation targets to prevent sovereign insolvency, cementing permanent financial repression.

The Cantillon Effect and Financialization

Conceptual Foundations: The Cantillon Effect, Richard Cantillon (1730s), First Receivers vs

Last Receivers, Asset Price Inflation vs CPI

Core Insight: The Cantillon Effect, formulated by Franco-Irish economist Richard Cantillon in the 1730s, proves that newly created money is not distributed evenly, but flows along institutional pipelines, enriching early receivers at the expense of later receivers.

New money enters at specific points—government contractors, primary dealer banks, and corporate borrowers. These first receivers spend the new money before prices have risen. By the time the money trickles down to wage earners and rural consumers, prices of goods have already surged, reducing their real living standards.

Core Insight: First receivers of new money (commercial banks, hedge funds, private equity, and sovereign entities) exploit early access to buy real assets and equities at prevailing pre-inflation prices.

An investment bank that borrows at 1% interest can purchase prime commercial real estate or acquire competing companies. By the time general consumer wages increase years later, asset prices have doubled, locking late receivers out of ownership.

Core Insight: Last receivers of new money—such as wage workers, pensioners, and low-income households—experience higher consumer prices long before their nominal wages or fixed payments adjust.

Because wage contracts and pensions are sticky and renegotiated infrequently, inflation acts as an immediate pay cut for workers, while corporate profit margins and executive asset values soar.

Core Insight: Asset price inflation disproportionately outpaces Consumer Price Index (CPI) inflation under central bank credit expansion because newly created capital concentrates in financial markets rather than consumer basket goods.

Central bank liquidity injections flow into institutional investment portfolios. Because wealthy investors do not buy millions of loaves of bread, the money bids up stocks, bonds, and housing, allowing policymakers to claim 'low inflation' while the cost of wealth accumulation skyrockets.

Core Insight: The financialization of the economy refers to the structural shift where the financial sector expands to dominate corporate profits, GDP, and capital allocation over manufacturing and tangible production.

The financial sector's share of US corporate profits rose from a small minority in the early postwar decades to roughly 30-40% at its early-2000s peak. Companies increasingly generated returns through financial manipulation, debt refinancing, and mergers rather than engineering superior products.

Core Insight: Ultra-low interest rates and credit expansion incentivize corporate executives to engage in massive debt-financed share buybacks rather than long-term capital research and development.

By borrowing billions at 2-3% interest to repurchase their own shares, corporations reduced their share count, driving stock prices higher in the short term. This enriched senior executives whose compensation was tied to stock price metrics while leaving corporations fragile during economic shocks.

Core Insight: The financial website 'WTF Happened in 1971?' documents how productivity and real hourly compensation permanently diverged following the end of the gold standard in August 1971.

From 1945 to 1971, wages grew in tandem with worker productivity. Post-1971, productivity continued to surge due to computers and technology, but the resulting gains accrued almost entirely to capital owners and financial intermediaries, while worker wages stagnated.

Core Insight: Residential real estate transformed from a basic utility for shelter into the primary speculative savings vehicle and store of value for middle-class households.

Because fiat cash in a savings account loses purchasing power steadily to inflation, citizens were forced to treat their primary residences as investment vehicles, pushing the US median home price to roughly 5 times median household income by the early 2020s (and well above 8 times in some coastal metros), compared with about 3-4 times historically.

Core Insight: The Gini coefficient, measuring national wealth and income inequality, has risen in the United States since the early 1970s, and in many (though not all) developed nations, a period that coincides with, but is not proven to be caused by, the move to pure fiat in 1971.

Because the top 10% of US households own roughly 90% of corporate equities and mutual fund shares (Federal Reserve Distributional Financial Accounts) and a large majority of financial assets, every round of central bank monetary expansion disproportionately magnifies their net worth, while the bottom 50% who rely on cash wages fall further behind.

Core Insight: Zombie companies are debt-burdened corporations that generate only enough operating profit to service interest on their debts, kept alive exclusively through perpetual cheap debt refinancing.

In a healthy market economy, unproductive companies go bankrupt, releasing capital and labor to more innovative competitors. Central bank interest rate suppression prevents this creative destruction, locking up over 15-20% of public companies in zombie status.

Core Insight: In a fiat regime, ordinary citizens are forced to become amateur investment speculators simply to protect the purchasing power of their life savings from persistent monetary debasement.

Under a hard money standard, individuals could simply save gold coins in a bank and retain purchasing power across decades. Under fiat, saving in cash guarantees financial impoverishment, forcing society to spend enormous cognitive energy on financial speculation.

Core Insight: The financial sector captures an immense 'tollbooth' on economic life by extracting fees on every electronic credit transaction and debt issuance required by fiat centralization.

Because citizens cannot use physical sovereign cash for digital transactions, banks and payment processors collect substantial fees on electronic payments and credit.

Core Insight: The Cantillon Effect accelerates during national emergencies when government-channeled liquidity bailouts rescue elite financial institutions while main street small businesses are forced into liquidation.

During both the 2008 GFC and the 2020 pandemic lockdowns, trillions in emergency liquidity and credit backstops went first to banks, primary dealers and other large financial institutions (2008) and to large

corporations, including airlines (2020), while many small businesses closed permanently despite programs such as PPP.

Core Insight: Constant monetary inflation shortens societal time preference, discouraging long-term capital investment and craftsmanship in favor of short-term consumption and financial trading.

If money holds its value across decades, people plan for the distant future, invest in quality durable goods, and build enduring institutions. Rapidly depreciating money forces people into a 'spend-it-or-lose-it' mentality, eroding societal patience.

Core Insight: The combination of fiat credit expansion and the Cantillon Effect hollows out the middle class, polarizing society into a small financial asset-owning oligarchy and a debt-burdened working class.

As asset prices disconnect from real wages, entry into the asset-owning class becomes unattainable for those without inherited wealth, fueling political polarization, social unrest, and demands for radical political intervention.

Key terms

Quantitative Easing (QE)

An asset swap where the central bank creates new reserves to purchase bonds from commercial banks, expanding bank reserves without directly injecting retail M2 money.

Legal Tender Laws

Statutory mandates legally compelling courts, citizens, and creditors to accept the state's unbacked fiat paper notes at par for all contractual debts.

The Cantillon Effect

The asymmetric economic distortion where newly created money enriches early receivers who spend it first, while devaluing the purchasing power of later receivers.

Financialization

The structural economic shift where the financial sector expands to dominate corporate profits, GDP, and capital allocation over physical manufacturing and research.

Zombie Companies

Unproductive corporate entities that earn only enough cash to service interest on their debts, surviving solely by rolling over cheap credit in a suppressed-rate regime.

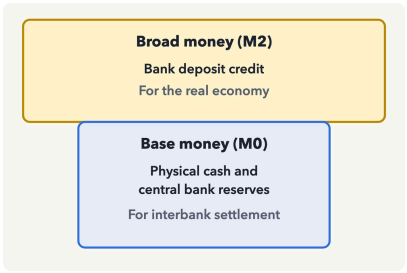
Key facts



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Bank of England 2014 Clarification

Landmark central bank publication confirming that commercial bank lending creates new deposits ex nihilo, officially correcting traditional textbook multiplier models.



FlashFeed original diagram · CC-BY-4.0

Compare base money (M0) with broad money (M2) in the modern financial hierarchy.

M0 consists of physical cash and central bank reserves used for interbank settlement, whereas M2 consists of commercial bank deposit credit used in the real economy.



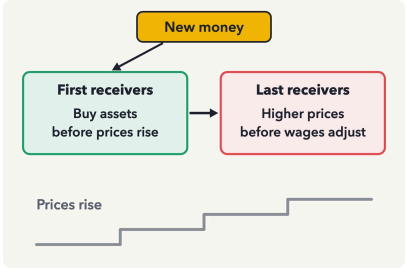
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Ample-Reserves Regime

Modern central banking framework controlling short-term interest rates via administered rates (IORB and ON RRP) rather than scarce reserve open-market operations.

Shadow Banking System

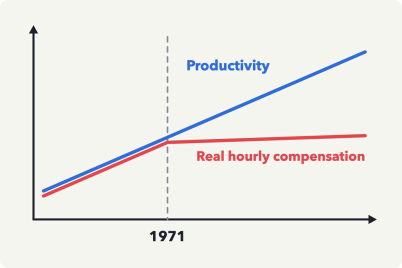
Non-bank financial intermediaries that perform credit transformation via repo markets and commercial paper without direct access to central bank discount windows.



FlashFeed original diagram · CC-BY-4.0

Contrast first receivers versus last receivers of newly created money.

First receivers deploy new credit before prices rise to buy appreciating assets, while last receivers face higher consumer prices long before wages adjust.



FlashFeed original diagram · CC-BY-4.0

WTF Happened in 1971?

Economic analysis documenting the historic post-1971 decoupling where American worker productivity continued rising while real hourly compensation flatlined.

> **The Financial Sector Tollbooth**
>
> The structural extraction of fees on every electronic payment and debt issuance, enforced by the elimination of physical sovereign bearer cash.

> **Compare the treatment of Wall Street institutions and main street businesses.**
>
> Elite financial institutions receive direct central bank backstops and low-interest loans, while ordinary small businesses face unforgiving bankruptcy during economic shocks.

Matched pairs

Each item on the left goes with the one on the right.

Loan Principal Repayment → Extinguishes the deposit liability and permanently destroys broad money.

Inflation Tax
→ Quietly devalues cash savings to transfer real wealth from savers to the sovereign debtor.

Credit Pyramid Apex → Derivatives, shadow banking debt, and complex private credit instruments.

Residential Real Estate
→ Transformed from shelter into a speculative savings asset, pricing out younger generations.

Self-test

Answer each question from memory, then check your work against the answer key.

1. When a commercial bank originates a new loan, what does modern (corrected) banking theory say happens?

(A) Draws down its central bank reserve account
(B) Lends out existing depositors' savings
(C) Sells government bonds to fund the loan
(D) Creates a new deposit as a liability

2. Which central bank published a 2014 paper confirming that lending creates new deposits, correcting old textbook models?

(A) Federal Reserve
(B) Bank of England
(C) European Central Bank
(D) Bank for International Settlements

3. Which of these is part of base money (M0) rather than broad money (M2)?

- A Central bank reserves
- B Commercial bank checking deposits
- C Savings account balances
- D Money market fund shares

4. Which action directly and immediately expands M2 broad money in consumers' bank accounts?

- A Quantitative Easing bond purchases
- B Raising the interest on reserve balances
- C Fiscal deficit spending via stimulus checks
- D Central bank reserve requirement cuts

5. In March 2020, to what level did the Federal Reserve reduce commercial bank reserve requirement ratios?

- A 5%
- B 0%
- C 8%
- D 3%

6. What is the Cantillon Effect?

- A Inflation affects all income groups at the same time
- B Central banks always distribute new money equally
- C Consumer prices always rise faster than asset prices
- D New money benefits early recipients before prices rise

7. New central bank liquidity flowing into financial markets tends to cause what, relative to official CPI inflation?

- A Asset prices rising much faster than CPI
- B Both moving at exactly the same pace
- C Consumer prices rising much faster than asset prices
- D Wages rising faster than both asset prices and CPI

8. What does 'financialization' describe?

- A Manufacturing overtaking finance in GDP share
- B Research spending outpacing financial services
- C Finance sector dominating profits over manufacturing
- D Agriculture becoming the dominant economic sector

9. What historic economic pattern is documented starting around 1971, per 'WTF Happened in 1971?'

- A Both productivity and real pay declined together
- B Productivity kept rising while real pay flatlined
- C Both productivity and real pay rose together steadily
- D Productivity fell while real pay kept rising

10. Persistent monetary inflation is said to shorten societal what, favoring short-term consumption over long-term investment?

- A Time preference
- B Investment horizon
- C Risk tolerance
- D Liquidity preference

Go deeper

ONLINE This lesson on the web flashfeedlearningapp.com/study-guides/broken-money/lesson-4-pure-fiat-mechanics-and-the-cantillon-effect

STUDY Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better in the FlashFeed app flashfeedlearningapp.com/packs/broken-money

LESSON 5 OF 7

Lesson 5: Global Reserve Hegemony: Eurodollars & Petrodollars

5.1 The Offshore Eurodollar Matrix · 5.2 The Petrodollar and Monetary Imperialism

WHAT YOU'LL BE ABLE TO DO

- Explain how the offshore Eurodollar market lets banks create dollar credit beyond Fed limits, forcing emergency swap lines.
- Explain the petrodollar system's origins and how dollar reserve status enables monetary imperialism, from the CFA Franc to asset freezes.

Monograph Section: Lesson 5 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Explores the shadowy mechanics of the offshore Eurodollar banking market where dollars are created outside US regulatory borders, the 1974 US-Saudi Petrodollar pact establishing structural global dollar demand, the petrodollar recycling loop into US Treasuries, monetary neocolonialism, how the US exports its domestic inflation to the developing world, and systemic sovereign debt crises on the global periphery.

The Offshore Eurodollar Matrix

Conceptual Foundations: Eurodollar Definition, Offshore Dollar Creation, Soviet Origins (Moscow Narodny Bank), Regulation Q Arbitrage

Core Insight: A Eurodollar is any US dollar-denominated bank deposit held at a financial institution located outside the regulatory jurisdiction of the United States.

Whether in London, Tokyo, Zurich, or the Cayman Islands, foreign commercial banks maintain dollar balance sheets to facilitate global trade, originating trillions in dollar credit completely separate from the domestic US banking system.

Core Insight: The Eurodollar market originated in the 1950s during the Cold War when the Soviet Union placed its dollar earnings in European banks (like Moscow Narodny Bank) to avoid the risk of US asset freezes.

British banks welcomed these dollar deposits and began lending them to European corporations. Because these loans were denominated in dollars but booked in London, they were exempt from US banking regulations and reserve requirements.

Core Insight: US Federal Reserve Regulation Q, which capped the maximum interest rates domestic banks could pay on savings deposits, accelerated the flight of capital into unregulated offshore

Eurodollar accounts.

When US inflation rose in the 1960s, domestic banks could not raise deposit rates above the Fed's legal cap. London-based banks faced no such caps, drawing billions of dollars in corporate deposits across the Atlantic and creating an explosive offshore credit engine.

Core Insight: Foreign banks in the Eurodollar market create dollar credit ex nihilo through loan origination just as domestic US banks do, operating with minimal or zero reserve requirements.

The global supply of dollars is not controlled solely by the Federal Reserve. Trillions in offshore dollars are created and destroyed through the private balance sheet expansion of European, Asian, and offshore financial conglomerates.

Core Insight: The London Interbank Offered Rate (LIBOR) functioned for decades as the primary global interest rate benchmark for hundreds of trillions of dollars in offshore loans, bonds, and derivatives.

LIBOR was determined by daily self-reported interbank lending rates among major London banks, granting offshore institutions immense influence over global interest rate pricing until rigging scandals forced its replacement by SOFR.

Core Insight: The true aggregate size of the offshore Eurodollar market is virtually unmeasurable by official central bank statistics because offshore transactions are recorded on foreign ledgers outside Federal Reserve reporting rules.

The Bank for International Settlements (BIS) estimates that tens of trillions of dollars in hidden dollar liabilities exist off-balance-sheet in foreign exchange swaps and offshore credit facilities, dwarfing official domestic M2 numbers.

Core Insight: A foreign exchange (FX) swap is a functional offshore collateralized dollar loan where one currency is exchanged for dollars with an agreement to reverse the trade at a future date at a predetermined forward rate.

Foreign corporations and banks with local currency assets use FX swaps to obtain short-term dollars to pay for imported energy, commodities, and international debt service, exposing them to catastrophic rollover risk when dollar liquidity tightens.

Core Insight: The Federal Reserve is structurally forced to act as the de facto global lender of last resort during international crises by opening emergency central bank dollar liquidity swap lines to foreign central banks.

If foreign banks cannot obtain dollars to roll over their maturing **Eurodollar** liabilities, they dump US assets in panic, driving US yields up and crashing American markets. The Fed must provide emergency swap lines to protect the domestic financial system.

Core Insight: The Eurodollar system establishes the US dollar as the dominant denominator of international trade, with the dollar used to invoice roughly half of global cross-border trade transactions — far above the US's own ~10% share of world trade.

Because the dollar is the most liquid, network-dense medium of exchange, international merchants denominate trade in dollars to minimize foreign exchange volatility and access global banking liquidity.

Core Insight: When the Federal Reserve raises domestic interest rates to combat US inflation, it inadvertently triggers severe offshore dollar shortages and currency crises across emerging market

economies.

When Fed rates rise, capital flees developing countries to earn higher risk-free yields in US Treasuries. Emerging market currencies crash, making it much harder for local governments and corporations to service their dollar-denominated debts.

Core Insight: The Society for Worldwide Interbank Financial Telecommunication (SWIFT), founded in 1973 in Belgium, provides the standardized, secure messaging infrastructure that coordinates cross-border bank ledger settlements.

SWIFT does not hold funds or clear payments itself; it provides the authenticated digital messaging protocols that instruct banks in different countries to debit and credit corresponding accounts on their respective ledgers.

Core Insight: Because the Clearing House Interbank Payments System (CHIPS) in New York clears over 95% of cross-border US dollar transactions, the US government exercises unilateral jurisdictional sanction power over global commerce.

Any bank anywhere in the world that clears dollar transactions must maintain a correspondent relationship with a US-regulated bank, subjecting global commerce to US legal subpoenas, OFAC sanctions, and political compliance mandates.

Core Insight: Eurodollar banks operate with substantial duration mismatches, borrowing overnight interbank dollar deposits to fund multi-year foreign infrastructure and sovereign loans.

This structural instability was exposed during the Latin American debt crisis of 1982 and the Asian financial crisis of 1997, where sudden withdrawal of short-term offshore dollar funding triggered immediate national economic collapse.

Core Insight: The offshore Eurodollar market created an uncontrollable monetary multiplier that significantly eroded the Federal Reserve's ability to precisely regulate the aggregate global dollar supply.

Lyn Alden argues that measuring and controlling the money supply became impossible as banking shifted to offshore balance sheets and electronic shadow-banking credit networks.

Core Insight: The structural reality of the modern international monetary system is that the world operates on an offshore, private commercial bank dollar standard backstopped by the US military and Federal Reserve.

Understanding global macroeconomics requires recognizing that the world runs on an offshore ledger of dollar-denominated bank credit, making global commerce intimately dependent on the health and policy decisions of the US banking nexus.

The Petrodollar and Monetary Imperialism

Conceptual Foundations: 1974 US-Saudi Petrodollar Agreement, Pricing Global Oil in USD, Petrodollar Recycling into US Treasuries, Artificial Global Dollar Demand

Core Insight: In 1974, the US and Saudi Arabia deepened a security-and-finance relationship — including a confidential arrangement for Saudi Arabia to buy US Treasury debt outside public auctions — that is popularly summarized as a 'petrodollar deal,' though historians have not found a

single signed treaty pricing Saudi oil exclusively in dollars in exchange for military protection, since Gulf oil was already dollar-denominated before 1974.

Faced with the collapse of gold backing, the US effectively backed the dollar with the world's most critical physical commodity—crude oil. By the mid-1970s, **OPEC** producers had largely followed **Saudi Arabia**'s lead in pricing and settling oil in dollars, which is the basis of the popular '**Petrodollar** System' narrative.

Core Insight: The Petrodollar system created mandatory, non-negotiable structural global demand for US dollars, forcing every nation on Earth to maintain dollar reserves to import energy for industrial survival.

If Germany, Japan, or India needed crude oil to power their factories and transportation grids, they had to earn, borrow, or hold US dollars. This gave the US the unprecedented ability to print paper currency to acquire foreign oil without suffering severe domestic exchange rate depreciation.

Core Insight: Petrodollar recycling was the systematic mechanism where oil-exporting OPEC nations channeled their massive dollar surpluses into US Treasury bonds and Wall Street financial markets.

This arrangement provided the US government with a permanent, deep, captive buyer for its growing sovereign national debt, keeping US interest rates low and funding massive American military, corporate, and consumer spending.

Core Insight: Monetary neocolonialism refers to the structural dynamic where core developed nations export their domestic monetary debasement to peripheral developing nations, extracting real resources while trapping them in dollar debt.

Developing nations must borrow in dollars to finance infrastructure. When local currencies devalue, their dollar debt burdens explode in real terms, forcing them to surrender state assets, mines, and ports to international creditors under IMF structural adjustment programs.

Core Insight: The Central African CFA Franc zone represents a direct institutional remnant of French monetary colonialism, where, as of 2025, six nations are still required to deposit 50% of their foreign exchange reserves in the French Treasury (the eight West African CFA Franc nations ended this requirement in a 2019-2020 reform).

While marketed as providing currency stability, the CFA Franc prevents African member nations from directing their own monetary policy, financing local industrialization, or protecting domestic industries against European imports.

Core Insight: Developing countries suffer from 'original sin' in international finance, defined as the inability of a sovereign nation to borrow in its own domestic currency on international markets.

When an emerging economy borrows in US dollars, a 30% drop in its domestic currency against the dollar raises the local-currency cost of that debt by about 43% overnight, triggering rapid sovereign insolvency and hyperinflation.

Core Insight: The Volcker Shock of 1979-1981, which raised the US Federal Funds rate to an unprecedented 20% to crush domestic inflation, triggered the catastrophic Latin American Debt Crisis of 1982.

Countries like Mexico, Brazil, and Argentina had borrowed billions in floating-rate **Eurodollar**s during the 1970s. When US interest rates spiked to 20%, their annual interest payments doubled, forcing a decade

of sovereign defaults, hyperinflation, and the 'Lost Decade'.

Core Insight: The International Monetary Fund's Structural Adjustment Programs (SAPs) historically imposed severe austerity, public spending cuts, and forced privatization of state assets on developing debtor nations in exchange for emergency dollar bailouts.

These austerity measures ensured that Western commercial banks and bondholders were repaid in full, while domestic populations in Asia, Africa, and Latin America endured prolonged economic depression and poverty.

Core Insight: The freezing of over $300 billion in Russian Central Bank foreign exchange reserves by the US and European allies in February 2022 fundamentally undermined global trust in the dollar as a politically neutral reserve asset.

For decades, foreign central banks treated US Treasuries as 'risk-free'. Freezing a major nuclear power's reserves demonstrated that any nation defying US foreign policy could have its national sovereign wealth frozen with a single keystroke, accelerating global de-dollarization.

Core Insight: The weaponization of the dollar and the SWIFT messaging network has catalyzed a global transition toward a multipolar monetary order where nations settle trade in local currencies, bilateral clearing mechanisms, and physical gold.

Nations like China, Russia, India, and Brazil increasingly settle bilateral oil, gas, and commodity trades in Yuan, Rubles, and Rupees, creating independent settlement architectures (like China's CIPS) to bypass US sanction vulnerabilities.

Core Insight: Global central bank net gold purchases surged to historic all-time highs following 2022, as non-Western nations diversified away from US Treasury bonds into politically unfreezable physical bearer assets.

Unlike US Treasuries—which are book-entry ledger claims held at the Federal Reserve Bank of New York—physical gold bars stored in a sovereign nation's domestic vault carry zero counterparty, credit, or sanction risk.

Core Insight: China's Cross-Border Interbank Payment System (CIPS) and the expansion of the BRICS coalition represent structural institutional challenges to the Western-dominated SWIFT dollar clearing monopoly.

As the BRICS economic bloc expands to include major energy producers (the UAE and Iran, with **Saudi Arabia** invited but, as of 2025, not formally confirmed as a member), the share of global petroleum traded outside the US dollar is steadily rising, marking the gradual dissolution of the 1974 **Petrodollar** monopoly.

Core Insight: Currency debasement is disproportionately catastrophic for developing nations because their domestic fiat currencies lack global reserve demand, causing local currencies to rapidly hyperinflate during fiscal stress.

When an emerging market government prints money, domestic citizens immediately dump the currency for US dollars or hard assets, causing the exchange rate to plummet and food/energy import prices to explode overnight.

Core Insight: The Petrodollar system created a structural domestic economic penalty for the United States often linked to the 'Triffin dilemma' (Robert Triffin, 1960): supplying the world's reserve

currency requires persistent external deficits, which sustain high demand for the dollar and weigh on domestic industrial export competitiveness.

Because foreign nations needed to export goods to the US to earn dollars for oil reserves, the US ran persistent merchandise trade deficits for 50 years, offshoring its industrial base to Asia while expanding its financial and defense sectors.

Core Insight: The breakdown of the unipolar Petrodollar regime signals the historical transition toward an open, neutral, decentralized international settlement medium that cannot be weaponized by any single nation.

In a multipolar world where major superpowers distrust each other, no nation will accept a rival's fiat currency as the sole global reserve. The world must inevitably converge on neutral, non-sovereign monetary technologies—such as gold and digital bearer assets.

Key terms

Eurodollar

A US dollar-denominated deposit balance held in a commercial bank located outside the legal borders and regulatory jurisdiction of the United States.

Foreign Exchange (FX) Swap

A functional offshore collateralized dollar loan where an entity exchanges foreign currency for dollars with an agreement to repurchase it at a future date.

The Petrodollar System

The post-1974 geopolitical financial regime requiring global crude oil exports to be settled in US dollars, creating non-negotiable structural global demand for the currency.

Original Sin in Macroeconomics

The structural vulnerability of developing economies that cannot borrow internationally in their own domestic currency, forcing them to issue debt in foreign US dollars.

Key facts

> **Regulation Q Arbitrage**
>
> The migration of corporate capital to London Eurodollar banks driven by the Fed's Regulation Q interest rate caps on domestic savings accounts.

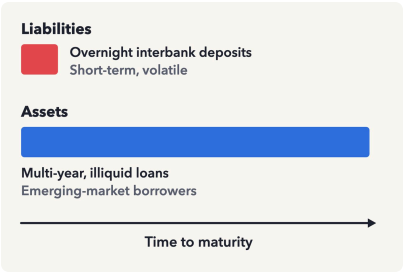


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Opaque Shadow Money Supply

The inability of central banks to accurately measure total global dollars due to off-balance-sheet FX swaps and offshore commercial bank balance sheets.

> **SWIFT Messaging Network (1973)**
>
> Belgian-based financial telecommunications backbone providing authenticated digital instructions to reconcile cross-border bank ledger payments across 11,000 institutions.



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Compare the funding structure and asset maturities of offshore Eurodollar banks.

Eurodollar Liabilities — Short-term, volatile overnight interbank deposits.

Eurodollar Assets — Multi-year, illiquid loans to emerging-market borrowers.

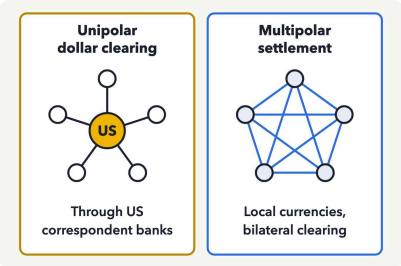
> **Monetary Neocolonialism**
>
> Structural exploitation where core nations print unbacked fiat to buy real resources, exporting inflation and trapping peripheral developing nations in dollar debt.



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IMF Structural Adjustment Programs

Austerity mandates requiring developing debtor nations to slash public spending and privatize state assets to repay Western commercial banks and bondholders.



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Compare unipolar dollar settlement with the emerging multipolar monetary order.

Unipolar Dollar Clearing — Routes all trade through US correspondent banks, subject to US jurisdiction and sanctions.

Multipolar Currency Settlement — Uses local currencies, bilateral clearing, and unfreezable physical gold.



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Periphery Currency Hyperinflation

The rapid destruction of purchasing power in developing economies (Lebanon, Argentina, Nigeria) where unbacked local fiat lacks global reserve demand.

Matched pairs

Each item on the left goes with the one on the right.

Trade Invoicing Dominance

→ In Latin America, over 80% of cross-border trade is invoiced in dollars — far above the dollar's ~40% share of trade worldwide.

Eurodollar System

→ Private offshore commercial banking network insured by US military and Fed swap lines.

China's CIPS System

→ Alternative cross-border settlement architecture designed to clear trade without SWIFT.

Post-Hegemonic Order

→ Transition toward neutral, decentralized settlement media that no single sovereign can weaponize.

Step by step

Trace the cyclical flow of capital in the Petrodollar recycling loop.

1. Global industrialized and developing nations earn or borrow US dollars to import oil.
2. OPEC oil exporters receive billions in dollar-denominated petroleum revenues.
3. Gulf monarchies reinvest surplus oil dollars into US Treasury bonds and Wall Street assets.
4. US government budget deficits and consumer trade deficits are continuously subsidized at low rates.

Self-test

Answer each question from memory, then check your work against the answer key.

1. What is a Eurodollar?

- A Eurozone government bond
- B Dollar-backed cryptocurrency
- C London dollar futures contract
- D US dollar deposit outside the US

2. Which nation's dollar deposits in European banks launched the Eurodollar market in the 1950s?

- A United Kingdom
- B Soviet Union
- C Saudi Arabia
- D West Germany

3. What did Fed Regulation Q do that pushed capital into Eurodollar accounts?

- A Capped domestic deposit interest rates
- B Taxed offshore loan interest
- C Banned foreign dollar holdings
- D Required 100% deposit reserves

4. What funding mismatch destabilizes offshore Eurodollar banks?

- A Long-term deposits funding overnight loans
- B Equity funding short-term trade credit
- C Overnight deposits funding multi-year loans
- D Central bank reserves funding bonds

5. Why does the Fed open emergency dollar swap lines during global crises?

- A Set foreign bank reserve requirements
- B Issue SWIFT messaging codes
- C Reset LIBOR benchmark rates
- D Provide dollar liquidity to foreign banks

6. Which arrangement, deepened by 1974 US-Saudi agreements, kept global oil trade priced in US dollars and recycled oil revenue into Treasuries?

- A Petrodollar System
- B Plaza Accord
- C Bretton Woods Agreement
- D CFA Franc Arrangement

7. Which is NOT a mechanism of monetary neocolonialism?

- A Dollar-only debt from Original Sin
- B Global corporate tax harmonization
- C Exporting inflation via unbacked fiat
- D IMF structural adjustment austerity

8. Which arrangement pegs six Central African nations' currency to the Euro with reserves held in the French Treasury?

- A Petrodollar System
- B Bretton Woods System
- C CFA Franc zone
- D IMF Structural Adjustment

9. Which reserve asset have central banks been stockpiling at record pace since the 2022 sovereign asset freezes?

- A Foreign currency reserves
- B Physical gold bullion
- C Special Drawing Rights (SDRs)
- D US Treasury bonds

10. Which settlement approach lets nations bypass US correspondent banking and sanctions?

- A Eurodollar interbank lending
- B Petrodollar recycling
- C Multipolar currency settlement
- D Unipolar dollar clearing

Go deeper

ONLINE This lesson on the web flashfeedlearningapp.com/study-guides/broken-money/lesson-5-global-reserve-hegemony-eurodollars-and-petrodollars

STUDY Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better in the FlashFeed app flashfeedlearningapp.com/packs/broken-money

LESSON 6 OF 7

Lesson 6: Digital Scarcity and the Bitcoin Architecture

6.1 Proof-of-Work and Thermodynamic Truth · 6.2 Consensus, Scarcity, and Node Sovereignty

WHAT YOU'LL BE ABLE TO DO

- Explain how Bitcoin's proof-of-work secures a fixed, unconfiscatable digital scarcity by anchoring the ledger to energy cost.
- Explain Bitcoin's 21 million cap, satoshi divisibility and UTXO model, why full nodes won the Blocksize War, and how the network effect locks in its lead.

Monograph Section: Lesson 6 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Analyzes how Bitcoin resolves the historical 180-year 'speed gap' by combining the hardness and unforgeable costliness of a physical bearer asset with the near-instantaneous velocity of telecommunications. Explores Satoshi Nakamoto's breakthrough in solving the double-spend problem, Proof-of-Work as a thermodynamic anchor to physical reality, the algorithmic difficulty adjustment, the 21 million absolute scarcity limit, Proof-of-Work versus Proof-of-Stake oligarchy, and decentralized full node sovereignty.

Proof-of-Work and Thermodynamic Truth

Conceptual Foundations: Digital Bearer Asset, Resolving the Speed Gap, Double-Spend Problem, Proof-of-Work (PoW)

Core Insight: Bitcoin fundamentally resolves the historical 180-year 'speed gap' by combining the absolute scarcity and bearer settlement of gold with the speed-of-light velocity of the internet.

Throughout history, humanity had to choose between slow physical gold (high hardness, zero speed) or centralized bank ledger credit (high speed, zero hardness). Bitcoin provides both: hard, unforgeable money that travels digitally across continents in minutes.

Core Insight: Satoshi Nakamoto's revolutionary innovation in the 2008 Bitcoin whitepaper was solving the computer science 'double-spend problem' without requiring a trusted central server.

If a digital token could be spent twice, it could not function as money. Previous digital cash attempts (DigiCash, E-Gold) relied on a central company to verify transactions, making them vulnerable to single points of failure, government shutdown, and internal corruption.

Core Insight: Proof-of-Work (PoW) anchors the digital ledger to the physical laws of thermodynamics by requiring miners to expend massive computational electricity to validate and timestamp

transactions.

In a digital world where code can be edited freely, **Proof-of-Work** requires irreversible real-world energy expenditure to generate blocks. Rewriting transaction history requires re-expending that exact immense physical energy, securing the ledger against fraud.

Core Insight: The Difficulty Adjustment algorithm, executing automatically every 2,016 blocks (approximately every two weeks), dynamically calibrates mining difficulty to maintain a steady 10-minute average block creation interval regardless of total network computational power.

With physical gold, higher prices incentivize more mining, increasing supply flow. With Bitcoin, if millions of new supercomputers begin mining, the difficulty automatically ratchets upward, ensuring that new supply issuance remains perfectly inelastic and fixed to the mathematical schedule.

Core Insight: The SHA-256 cryptographic hash function is a one-way mathematical operation that compresses arbitrary digital data into a unique 256-bit hexadecimal string that is computationally irreversible.

While finding a valid hash requires massive energetic brute force, verifying that a discovered hash is valid takes a fraction of a millisecond for any consumer laptop, creating an asymmetrical architecture where validation is nearly free while block creation is energetically costly.

Core Insight: Proof-of-Work mining utilizes stranded, curtailed, and non-rival energy sources—such as flared methane gas, remote hydro, geothermal, and solar curtailment—monetizing wasted electrons that cannot reach urban power grids.

Unlike factories or aluminum smelters that require roads and urban labor, Bitcoin miners can be installed in shipping containers directly at remote wellheads or dams, transforming stranded physical energy into globally liquid financial value.

Core Insight: Proof-of-Stake (PoS) consensus replaces physical energy expenditure with financial capital staking, structurally recreating the Cantillon Effect and oligarchic governance of the traditional fiat banking system.

In PoS, the wealthiest holders validate blocks without incurring real-world operating expenses, allowing them to perpetually compound their ownership share and exercise voting control over the network rules without physical market competition.

Core Insight: In Proof-of-Work, a miner who stops investing in electricity and upgrading hardware immediately loses their hash rate share and influence over the network.

Unlike PoS or fiat banking (where capital earns passive risk-free returns without work), PoW forces miners into intense, continuous physical competition with rising energy efficiency, preventing permanent entrenched monopolies.

Core Insight: The Blocksize War (2015-2017) demonstrated that economic full nodes run by ordinary users, rather than miners or corporate giants, maintain sovereign control over the consensus rules of the Bitcoin protocol.

Corporate mining monopolies and venture capital firms signed the New York Agreement (SegWit2x) to expand block sizes, which would have increased hardware requirements and centralized node operation. Ordinary users running $50 Raspberry Pi nodes refused to validate the corporate blocks, preserving decentralization.

Core Insight: A full node is a computer running open-source software that independently downloads, verifies, and validates every single block and transaction since the genesis block against the protocol's consensus rules without trusting any third party.

Unlike light mobile wallets that query centralized servers, an independent full node enforces the **21 million** supply limit, verifies digital signatures, and rejects invalid blocks, ensuring that miners cannot secretly debase the currency or censor valid transactions.

Core Insight: Hal Finney, a legendary cryptographic pioneer and the recipient of the first Bitcoin transaction from Satoshi Nakamoto in January 2009, envisioned Bitcoin operating as a high-powered reserve currency for layered banks.

Finney recognized early that a decentralized base blockchain cannot process billions of daily retail coffee transactions without compromising node decentralization, anticipating the layered scaling architecture of the **Lightning Network**.

Core Insight: A 51% attack on Bitcoin becomes exponentially more expensive over time as total global hash rate and energy consumption expand across international borders.

Even if an attacker momentarily amassed 51% of hash rate, they could not create coins out of thin air or steal private keys—they could only attempt to double-spend their own recent transactions. The network's full nodes would instantly reject any invalid block that violated consensus rules.

Core Insight: Bitcoin's Genesis Block was mined by Satoshi Nakamoto on January 3, 2009, embedding the famous text: 'The Times 03/Jan/2009 Chancellor on brink of second bailout for banks'.

By embedding this headline, Nakamoto established the historical context of Bitcoin's creation during the Great Financial Crisis, demonstrating that Bitcoin was engineered specifically to replace corruptible fiat bank ledgers with algorithmic scarcity.

Core Insight: The energy expenditure of Bitcoin mining is not waste, but the indispensable cost of manufacturing trust, absolute scarcity, and censorship resistance in a digital medium.

Traditional fiat currencies require military forces, central bank headquarters, courts, and regulatory bureaucracies to enforce their ledgers. Bitcoin replaces these institutional apparatuses with pure thermodynamic energy and cryptographic mathematics.

Core Insight: By anchoring a digital ledger to thermodynamic reality, Bitcoin created the first completely non-sovereign, unconfiscatable, mathematically fixed bearer asset in human history.

Anyone who controls their own cryptographic private keys can transport billions of dollars in wealth anywhere in the world in their memory via a 12-word seed phrase, completely immune to physical seizure, border controls, or sovereign debasement.

Consensus, Scarcity, and Node Sovereignty

Conceptual Foundations: 21 Million Hard Supply Cap, Halving Epochs Schedule, UTXO Transaction Model, Public-Key Asymmetric Cryptography

Core Insight: Bitcoin possesses an absolute mathematical supply limit of 21,000,000 bitcoins, coded into its open-source protocol and enforced by thousands of independent validating full nodes

worldwide.

Because every full node independently rejects any block containing more block reward subsidies than permitted by code, no mining pool, government, or billionaire can increase the **21 million** cap without being rejected by the network.

Core Insight: The programmatic halving occurs every 210,000 blocks (roughly every four years), cutting the new block issuance subsidy in half until terminal issuance ceases around the year 2140.

With each halving, Bitcoin's annual supply inflation rate drops in half. Following the 2024 halving, Bitcoin's annual inflation rate fell to ~0.8%, making it mathematically the hardest monetary asset ever created, with a stock-to-flow ratio surpassing gold.

Core Insight: Bitcoin operates on the Unspent Transaction Output (UTXO) accounting model, where transactions consume discrete cryptographic outputs from previous transactions rather than adjusting account balances.

The **UTXO** model resembles physical cash transactions: if you have a 20 bill and buy an 8 book, you surrender the entire 20 bill (input) and receive an 8 payment to the bookstore and a $12 change output back to yourself.

Core Insight: Asymmetric public-key cryptography (specifically the ECDSA secp256k1 elliptic curve) allows users to generate public receiving addresses from private keys without ever exposing the private spending key.

You can publish your public address freely to receive funds from anyone. However, without your private cryptographic key, it is mathematically impossible for an attacker or sovereign government to reverse-engineer the private key or move your funds.

Core Insight: BIP-39 (Bitcoin Improvement Proposal 39), established in 2013, introduced 12-to-24-word human-readable mnemonic seed phrases to backup and restore cryptographic private master keys.

A user does not need to store files or USB drives; memorizing 12 words allows a refugee fleeing war or authoritarian persecution to cross borders with their entire life savings intact in their mind, recovering their funds on any computer worldwide.

Core Insight: The fundamental maxim of sovereign digital self-custody is 'Not your keys, not your coins,' highlighting the critical distinction between holding bearer assets and holding claims on a centralized exchange.

When an investor leaves Bitcoin on an exchange (like FTX, Celsius, or Mt. Gox), they do not hold Bitcoin; they hold an unsecured account balance on a private company's internal database, exposing them to the exact custodial failures of the traditional banking system.

Core Insight: Censorship resistance is the architectural guarantee that any transaction accompanied by a valid cryptographic signature and sufficient transaction fee will be processed by the network regardless of the sender, recipient, or purpose.

In traditional banking, governments can instruct **SWIFT**, Visa, or banks to freeze political dissidents' accounts (as seen in the Canadian truckers' protest in 2022). Bitcoin treats all valid transactions equally, preventing state censorship.

Core Insight: Bitcoin is divisible down to eight decimal places, with the smallest unit called a 'Satoshi' (sat), representing 0.00000001 BTC, providing 2.1 quadrillion total transactional units.

Divisibility ensures that supply scarcity does not create unit friction. As purchasing power appreciates, prices of goods in satoshis naturally decline, facilitating retail commerce without altering the base supply cap.

Core Insight: Multisignature (multisig) architectures require M-of-N distinct cryptographic private keys to authorize a single transaction, eliminating single points of failure for corporate treasuries and institutional custody.

A company can hold one key in New York, one in London, and one with a third-party security partner. To spend funds, any two keys must sign, ensuring that the theft or loss of a single key cannot compromise corporate assets.

Core Insight: Hardware wallets (cold storage devices) isolate cryptographic private keys on secure offline microcontrollers, signing transactions locally without ever exposing keys to internet-connected computers.

Even if your laptop or phone is infected with malicious spyware, connecting a hardware wallet (like Coldcard, Trezor, or Ledger) is safe because the device only outputs the signed transaction data, never the raw private key.

Core Insight: Bitcoin's backward-compatible upgrades are implemented via 'soft forks', which tighten existing protocol rules without fracturing the network or forcing old nodes to upgrade immediately.

Major upgrades like Segregated Witness (SegWit in 2017) and Taproot (in 2021) were deployed as soft forks. Nodes running 2013 software continue to recognize valid blocks, protecting the network against contentious chain splits.

Core Insight: The mempool (memory pool) is the decentralized holding area where unconfirmed transactions reside on individual full nodes while awaiting selection and inclusion into a block by miners.

Unlike fiat payment rails where fees are set administratively by credit card networks, Bitcoin block space fees fluctuate dynamically based on market supply and demand for urgent global settlement.

Core Insight: Bitcoin's fixed supply schedule represents the complete inversion of fiat central banking: whereas fiat supplies expand infinitely under discretionary human committees, Bitcoin's supply is determined by unalterable mathematics.

For the first time in history, market participants do not need to guess what the Federal Reserve will do next month or analyze central bank speeches. The future supply curve of Bitcoin is known with absolute certainty for the next 100+ years.

Core Insight: In open-source software, network effects create immense structural inertia around the dominant monetary protocol, making it nearly impossible for newer copycat cryptocurrencies to replace Bitcoin as the premier monetary base.

Just as the internet converged on TCP/IP and HTTP as base communication standards, the global financial system converges on a single Schelling point for hard digital money. Forks and altcoins lack the unforgeable hash rate security and decentralized node distribution.

Core Insight: Bitcoin provides an unalterable, globally neutral monetary baseline that restores individual property rights and financial privacy in an increasingly surveillance-oriented global economy.

Regardless of race, religion, nationality, or political affiliation, any person with a basic smartphone can participate in global commerce, save value across time, and protect their family's wealth from state confiscation.

Key terms

Double-Spend Problem

The computer science challenge of ensuring a digital asset cannot be duplicated and spent more than once without relying on a trusted central authority.

Bitcoin Full Node

A computer running open-source software that independently downloads, validates, and enforces every consensus rule across all blocks and transactions since the genesis block.

UTXO (Unspent Transaction Output)

Bitcoin's accounting model where transactions consume discrete cryptographic outputs from previous transactions as inputs and produce new unspent outputs.

Censorship Resistance

The protocol guarantee that any transaction accompanied by a valid cryptographic signature and sufficient fee is processed regardless of identity or purpose.

The Mempool (Memory Pool)

The dynamic, decentralized holding area where unconfirmed transactions reside on validating nodes while awaiting block inclusion based on fee priority.

Key facts

> **Thermodynamic Ledger Bridge**
>
> Proof-of-Work consensus mechanism requiring miners to burn real-world electricity to validate blocks, anchoring digital ledger history to physical physical energy laws.

> **Stranded Energy Monetization**
>
> The economic deployment of location-agnostic Bitcoin mining rigs to monetize flared oilfield methane, remote hydro, and curtailed renewable power that cannot reach urban grids.

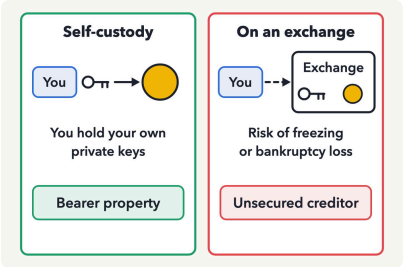
> **Compare the governance and incentives of Proof-of-Work versus Proof-of-Stake.**
>
> Proof-of-Work forces miners to keep spending real-world energy and hardware to keep validating blocks — stop mining and your influence drops to zero. Proof-of-Stake instead grants validation power and yield based on existing coin holdings, letting the largest holders compound their share without physical competition, which critics say recreates the entrenched, oligarchic dynamics of fiat banking.

Genesis Block Timestamp (Jan 3, 2009)

The headline 'Chancellor on brink of second bailout for banks' embedded into Bitcoin's first block, establishing it as an explicit technological alternative to fiat banking.

BIP-39 Mnemonic Seed Phrases (2013)

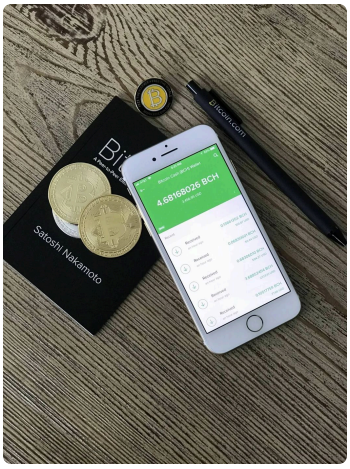
Standard encoding complex 256-bit cryptographic keys into 12-to-24 common English words, allowing individuals to carry fortunes in human memory across borders.



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Contrast sovereign self-custody with holding Bitcoin on a centralized exchange.

Holding your own private keys makes bitcoin your outright bearer property. Leaving it on a custodial exchange (like FTX or Celsius) instead makes you an unsecured creditor of that company, exposed to freezing, rehypothecation, and loss if it goes bankrupt.



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Hardware Wallet Air-Gap Security

Dedicated microcontroller devices that store private keys completely offline, signing transactions internally to protect against malware and remote hacking.

Matched pairs

Each item on the left goes with the one on the right.

Proof-of-Work Miner
→ Must continuously burn power; turning off machines immediately reduces network influence to zero.

Bitcoin Security Cost
→ Thermodynamic energy expenditure securing a $1+ trillion property rights network without armies.

Soft Fork (SegWit/Taproot)
→ Tightens rules backward-compatibly, allowing older validating nodes to recognize valid blocks.

Neutral Monetary Baseline
→ Restores individual property rights, financial privacy, and economic freedom in a digital world.

Step by step

Trace the programmatic Bitcoin halving progression across its first five four-year epochs.

1. Genesis Epoch (2009): Block reward subsidy is set at 50.0 BTC per block.
2. First Halving (2012 at block 210,000): Reward drops to 25.0 BTC per block.
3. Second & Third Halvings (2016 & 2020): Reward drops to 12.5 BTC and then 6.25 BTC.
4. Fourth Halving (2024 at block 840,000): Reward drops to 3.125 BTC, pushing stock-to-flow above gold.

Self-test

Answer each question from memory, then check your work against the answer key.

1. Bitcoin closes the historical 'speed gap' by combining gold's hardness with what?

A Internet speed
B Bank-wire speed
C Telegraph speed
D Courier speed

2. What is the 'double-spend problem' that Satoshi's whitepaper solved without a central server?

A Leaking a private key twice
B Spending a digital asset twice
C Reusing a wallet address twice
D Mining a block twice

3. How often does Bitcoin's Difficulty Adjustment algorithm recalibrate mining difficulty?

A 6,000 blocks
B 144 blocks
C 2,016 blocks
D 500 blocks

4. Who received the first Bitcoin transaction from Satoshi Nakamoto?

A Wei Dai
B David Chaum
C Nick Szabo
D Hal Finney

5. Which of these is NOT required to maintain influence under Proof-of-Work?

A Hardware upgrades
B Continuous electricity spending
C Competitive mining effort
D Existing coin holdings

6. What is Bitcoin's absolute mathematical supply limit?

A 100 million
B 42 million
C 21 million
D 84 million

7. What does Bitcoin's UTXO accounting model track?

A Smart contract states
B Unspent transaction outputs
C Validator stake weights
D Total account balances

8. What is the name for Bitcoin's smallest sub-unit, worth 1/100,000,000 of a coin?

A Satoshi
B Wei
C Bit
D Ether

9. During the 2015-2017 Blocksize War, who preserved Bitcoin's decentralization by rejecting larger blocks?

A Venture capital firms
B Users running full nodes
C Corporate mining pools
D Central bank regulators

10. What term describes Bitcoin's liquidity, brand recognition, and hash rate compounding into an unmatched advantage?

A First-mover advantage
B Cantillon Effect
C Gresham's Law
D Network effect

Go deeper

ONLINE This lesson on the web flashfeedlearningapp.com/study-guides/broken-money/lesson-6-digital-scarcity-and-the-bitcoin-architecture

STUDY Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better in the FlashFeed app flashfeedlearningapp.com/packs/broken-money

LESSON 7 OF 7

Lesson 7: Layered Scaling, CBDCs, and the Monetary Horizon

7.1 Layered Architecture and Lightning · 7.2 CBDCs, Autonomy, and Long-Term Cycles

WHAT YOU'LL BE ABLE TO DO

- Explain how the Lightning Network's Layer 2 design, HTLCs, and onion routing enable fast, private, non-custodial payments.
- Explain how programmable CBDCs threaten privacy and autonomy, and how Ray Dalio's Long-Term Debt Cycle ends in currency devaluation and monetary reset.

Monograph Section: Lesson 7 of *Broken Money: Why Our Financial System Is Failing Us and How We Can Make It Better* by **Lyn Alden**.

Executive Overview

Explores the Blockchain Trilemma and why base-layer blockchains scale via layered architectures rather than oversized blocks. Deep-dives into the Lightning Network's peer-to-peer payment channels, comparative analysis between open decentralized protocols and centralized surveillance Central Bank Digital Currencies (CBDCs), real-world grassroots financial inclusion in high-inflation economies (Lebanon, Argentina, Nigeria), and the macroeconomic endgame of long-term sovereign debt cycles.

Layered Architecture and Lightning

Conceptual Foundations: The Blockchain Trilemma, Layered Money Architecture, Base Layer (L1) Settlement, Lightning Network (L2) Protocols

Core Insight: The Blockchain Trilemma, articulated by Vitalik Buterin, posits that a blockchain can maximize at most two of three properties simultaneously: decentralization, security, and scalability.

If a blockchain increases block sizes to process 50,000 transactions per second (like Visa), the ledger expands by hundreds of gigabytes per day. Only giant corporate data centers can afford to run nodes, destroying decentralization and creating a centralized system identical to traditional banking.

Core Insight: Just as the internet scaled through layered protocols (TCP/IP at the base layer, HTTP and SSL at higher application layers), monetary networks scale through layered architectures.

The base TCP/IP protocol does not stream video; it routes data packets reliably. Similarly, Bitcoin Layer 1 functions as the high-assurance global settlement layer (like Fedwire or sovereign gold transfers), while Layer 2 handles retail transactions.

Core Insight: The Lightning Network is an open-source Layer 2 protocol built on top of Bitcoin that enables instant, high-volume microtransactions with near-zero fees without cluttering the base blockchain.

Lightning transactions do not require mining new blocks. Counterparties open a channel on-chain, transact millions of times instantly off-chain, and record only the opening and closing net balances on the base Bitcoin blockchain.

Core Insight: A Lightning payment channel is established by locking funds into a 2-of-2 multisignature address on the Bitcoin base blockchain, creating an off-chain ledger between two parties.

Think of a Lightning channel like a bar tab: you open the tab with a credit card (on-chain lock), order dozens of drinks throughout the night with instant balance updates (off-chain), and close the tab with a single final settlement at the end of the evening.

Core Insight: Hash Time-Locked Contracts (HTLCs) enable payments to be securely routed across multiple intermediary nodes across the Lightning Network without trusting any intermediary.

If Alice wants to pay Carol but only has a channel with Bob (who has a channel with Carol), Alice routes the payment through Bob. Bob cannot steal the funds because he can only claim Alice's payment by revealing the cryptographic secret provided by Carol.

Core Insight: Lightning Network routing uses onion encryption (similar to the Tor network), ensuring that intermediate routing nodes only know the immediately preceding and succeeding hops, protecting user privacy.

When Bob routes a payment between Alice and Carol, Bob only knows he received satoshis from Alice to forward to Carol. He does not know if Alice is the original sender or if Carol is the ultimate recipient, providing superior transaction privacy compared to Visa or bank wires.

Core Insight: The Lightning Network achieves settlement finality within milliseconds, whereas traditional credit card rails (Visa, Mastercard) require 30 to 90 days for full chargeback and dispute settlement.

When a customer swipes a credit card, the merchant receives a provisional promise of payment. The actual funds take days to deposit and remain subject to chargebacks and reversal for months. Lightning settlement is instantaneous, final, and non-reversible.

Core Insight: Channel capacity in the Lightning Network refers to the total amount of Bitcoin locked in a payment channel, which constrains the maximum payment size that can be routed through that specific path.

If a channel has 1,000,000 sats capacity, it cannot route a 2,000,000 sat payment. Advanced protocols (like multi-path payments) solve this by splitting large payments into multiple small shards routed across different channels and reassembled at the destination.

Core Insight: Chaumian eCash mints (such as Cashu and Fedimint) provide a secondary Layer 3 scaling model that combines community custody with complete cryptographic transaction privacy.

Based on cryptographer David Chaum's 1982 invention, eCash mints allow small communities (churches, villages, clubs) to pool custody while using blinded cryptographic tokens where even the mint operator

cannot see who is paying whom or what balances they hold.

Core Insight: The Lightning Network enables machine-to-machine microtransactions, allowing automated AI agents and IoT devices to pay fractions of a cent per API call or per second of streaming data.

Traditional banking cannot process transactions under $0.50 because fixed card fees (30 cents + 3%) make micro-payments impossible. Lightning can route 0.001 cents efficiently, creating new business models for streaming media, spam prevention, and AI services.

Core Insight: Watchtowers are specialized third-party services on the Lightning Network that monitor the base blockchain to protect offline users against fraudulent channel closures by cheating counterparties.

If Alice goes on vacation without internet and Bob tries to broadcast an old channel balance from last week, Alice's watchtower automatically catches the invalid state and penalizes Bob by seizing his entire channel balance, making cheating economically fatal.

Core Insight: Unlike centralized Layer 2 solutions (like traditional fintech apps), the Lightning Network is completely non-custodial and open-source, allowing anyone to run a routing node without corporate permission.

Unlike PayPal or Venmo—where a central corporation can freeze your funds, limit transactions, or deny service—Lightning nodes operate independently, forming an uncensorable global mesh network.

Core Insight: The integration of the Lightning Network into global payment platforms (like Strike, Cash App, and Bitso) enables frictionless real-time international remittances that bypass traditional 7% Western Union fees.

A worker in the US sends dollars; the app converts dollars to Bitcoin, routes it across the **Lightning Network** in 500 milliseconds for a fraction of a cent, and converts it instantly into local currency in the recipient's bank account, saving migrant workers billions in predatory wire fees.

Core Insight: Statechains and spacechains represent alternative non-custodial Layer 2 scaling architectures that allow the off-chain transfer of UTXO ownership without broadcast to the base blockchain.

These advanced second-layer architectures complement Lightning by allowing users to onboard and offboard liquidity with fewer on-chain footprints, addressing base-layer block space constraints.

Core Insight: Layered scaling proves that Bitcoin does not need to compromise its base-layer decentralization and unforgeable hardness in order to serve as a high-velocity transactional currency for billions of global users.

Bitcoin avoids the catastrophic centralization that doomed previous fiat experiments. By keeping Layer 1 rock-solid and immutable, all higher layers inherit the unforgeable scarcity and security of the base thermodynamic ledger.

CBDCs, Autonomy, and Long-Term Cycles

Conceptual Foundations: Central Bank Digital Currencies (CBDCs), Programmable Money and Surveillance, Expiry Dates and Negative Interest Rates, Financial Deplatforming

Core Insight: A Central Bank Digital Currency (CBDC) is a digital liability of a central bank that allows the state to directly observe, track, program, and restrict individual citizen transactions on a centralized sovereign ledger.

Unlike physical cash (which is anonymous and peer-to-peer) or commercial bank deposits (which are intermediated by private banks), a **CBDC** gives central planners a real-time panopticon over every coffee bought, book read, and donation made across the nation.

Core Insight: CBDCs introduce programmable money capabilities, allowing governments to program geographic spending boundaries, category restrictions, expiration dates on savings, and automatic tax deductions into currency units.

In a programmable **CBDC** regime, money is no longer a neutral property right; it is a conditional government voucher that can be configured to expire in 90 days, deactivated outside a specific postal code, or banned from purchasing certain fuels or foods.

Core Insight: CBDCs eliminate the physical cash lower bound, empowering central banks to impose deeply negative nominal interest rates (-3% to -5%) directly on citizens' savings to force consumption during recessions.

With physical cash, if a bank charges -3% interest, depositors simply withdraw physical cash bills and store them in a home safe. A cashless **CBDC** traps all capital inside the central bank's ledger, allowing the state to drain private wealth at will.

Core Insight: Agustin Carstens, General Manager of the Bank for International Settlements (BIS), said in October 2020 that with a CBDC the central bank would have absolute control over the rules and regulations determining its use, and the technology to enforce them.

Carstens highlighted the profound difference between cash and **CBDC**s: with cash, central banks do not know who holds the $100 bill or how it is spent. With a CBDC, he said, the central bank would set the rules governing its use and have the technology to enforce them.

Core Insight: Financial deplatforming and account freezes against peaceful political protestors (such as the Canadian Freedom Convoy in February 2022 under the Emergencies Act) demonstrate that traditional fiat banking lacks civil liberty protections.

Under the Emergencies Act the Canadian government ordered banks and payment processors to freeze more than 200 accounts linked to the protest and its donors. Some Canadians responded by turning to cash and self-custodial Bitcoin.

Core Insight: About 1.3 billion adults worldwide (World Bank Global Findex 2025, down from 1.4 billion in 2021) remain unbanked, excluded from the traditional financial system due to poverty, lack of official identity documentation, and lack of bank branch infrastructure.

Traditional banks require identity papers, minimum balance fees, and physical branch visits that exclude rural and impoverished populations. Open-source monetary networks require only an inexpensive Android smartphone and an open-source app.

Core Insight: In high-inflation economies like Nigeria, Argentina, and Lebanon, grassroots adoption of Bitcoin and dollar stablecoins functions as a critical survival tool to protect family wealth from currency collapse.

When the Lebanese pound lost 98% of its value and local banks froze customer deposits, citizens turned to Bitcoin and USDT on the **Lightning Network** to receive remittances from family abroad, buy groceries, and store value outside the bankrupt state banking system.

Core Insight: El Salvador made history on September 7, 2021, by becoming the first sovereign nation on Earth to adopt Bitcoin as legal tender alongside the US dollar under the leadership of President Nayib Bukele.

With over 70% of Salvadorans unbanked and relying heavily on expensive remittances from abroad, **El Salvador** adopted Bitcoin to eliminate remittance friction, attract foreign investment, and establish monetary sovereignty outside the US banking system.

Core Insight: Ray Dalio's Long-Term Debt Cycle model demonstrates that human financial systems experience multi-decade (often cited as roughly 50-to-100-year) macroeconomic super-cycles that culminate in massive debt restructurings, currency debasement, and monetary resets.

Short-term debt cycles (5-8 years) end in regular recessions managed by cutting interest rates. When interest rates hit zero and debt keeps climbing, the long-term debt cycle culminates in sovereign currency devaluation and systemic monetary transformation. In the United States, public debt rose from roughly 40% of GDP in 1936 to about 112% of GDP at the end of World War II in 1945.

Core Insight: The four historical methods for resolving an unsustainable sovereign debt burden are: austerity (fiscal cuts), hard sovereign default (bankruptcy), debt restructuring (negotiated haircuts), and currency debasement (monetization).

Austerity triggers political revolution, while outright default destroys the domestic banking system. Politicians and central bankers consistently choose inflation because it devalues debt quietly, spreading the pain across all currency holders.

Core Insight: Fiscal dominance occurs when the scale of government deficits and national debt becomes so enormous that the central bank can no longer prioritize inflation targets, forced instead to suppress interest rates to keep the government solvent.

When national debt reaches $35+ trillion, every 1% increase in interest rates adds hundreds of billions in annual federal debt service. The central bank is forced to print money and purchase bonds to cap yields, guaranteeing persistent structural inflation.

Core Insight: Financial repression is a policy toolkit used by heavily indebted governments to force domestic institutions and pension funds to hold government bonds that yield below the real rate of inflation, quietly liquidating national debt.

Between 1945 and 1975, the US government successfully reduced its World War II debt-to-GDP ratio from about 112% to about 35% with the help of financial repression—running inflation higher than bond yields for much of those decades, quietly eroding purchasing power from bondholders.

Core Insight: The clash between centralized surveillance CBDCs and open-source decentralized protocols represents the defining civil liberties battle of the 21st century.

Money is the foundational medium of human cooperation. If money becomes a programmable **CBDC**, freedom of speech, assembly, and political opposition can be extinguished with a single keystroke. Open protocols like Bitcoin preserve human freedom in the digital age.

Core Insight: Gresham's Law and Thiers' Law interact in monetary evolution: bad money drives out good money during mild inflation (as good money is hoarded), but during extreme hyperinflation, good money drives out bad money as society abandons the worthless currency.

When inflation reaches crisis levels, citizens stop accepting local fiat entirely, demanding payment in gold, US dollars, or Bitcoin. The market spontaneously demonetizes the broken fiat ledger and adopts the superior hard asset.

Core Insight: Lyn Alden concludes *Broken Money* with the profound insight that fixing the world's money is the single highest-leverage endeavor for fixing global human flourishing, peace, and economic justice.

Corrupt and broken money fuels endless deficit-financed wars, concentrates wealth in political oligarchies, and impoverishes working families worldwide. Establishing honest, decentralized, hard money is the essential foundation for a free and thriving human future.

Key terms

The Blockchain Trilemma

The engineering principle stating that a blockchain cannot simultaneously maximize all three properties of decentralization, security, and scalability on a single layer.

HTLC (Hash Time-Locked Contract)

Cryptographic payment script enabling trustless multi-hop routing across intermediary nodes, guaranteeing payments either settle completely or fail safely without loss.

Chaumian eCash (Fedimint/Cashu)

Layer 3 blinded cryptographic mint protocols allowing community federations to issue instant, private digital tokens backed by pooled on-chain Bitcoin reserves.

Central Bank Digital Currency (CBDC)

A direct digital liability of a central bank establishing real-time operational surveillance, tracking, and programmable spending restrictions over individual citizens.

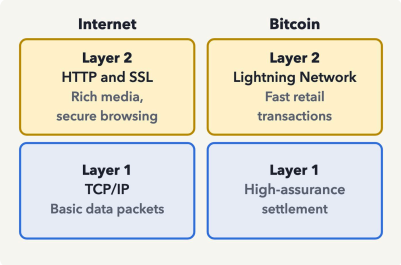
Ray Dalio's Long-Term Debt Cycle

An 80-to-100-year macroeconomic super-cycle where accumulating debt exhausts central bank rate cuts, culminating in massive sovereign debt monetization and monetary resets.

Fiscal Dominance

The terminal phase of a fiat regime where government debt is so immense that central bank policy is subjugated to monetizing runaway Treasury deficits at suppressed rates.

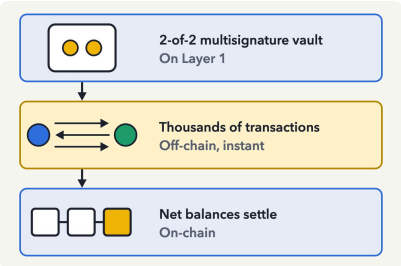
Key facts



FlashFeed original diagram · CC-BY-4.0

Compare the internet's scaling architecture with Bitcoin's layered architecture

TCP/IP (Layer 1) routes basic data packets, while HTTP and SSL (Layer 2) handle rich media and secure browsing. Bitcoin Layer 1 optimizes for high-assurance settlement, like a digital Fedwire, while the Lightning Network (Layer 2) handles fast, high-volume retail transactions.



FlashFeed original diagram · CC-BY-4.0

Lightning Payment Channels

Bidirectional 2-of-2 multisignature vaults on Layer 1 that allow counterparties to exchange thousands of off-chain transactions instantly, settling net balances on-chain.

Compare Lightning Network settlement finality with traditional payment networks

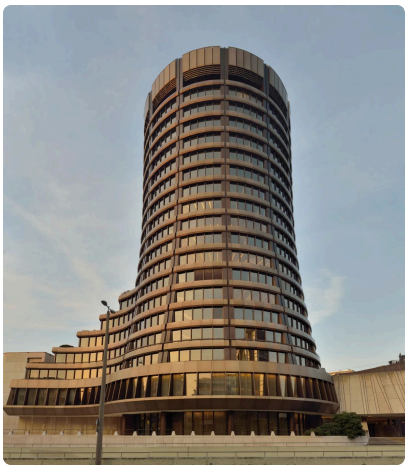
Credit card networks (Visa/Mastercard) give merchants only a provisional promise of payment, which stays open to chargebacks and disputes for 30 to 90 days. Lightning Network payments settle with irrevocable cryptographic finality within milliseconds.

Lightning Channel Capacity

The total liquidity locked in a payment channel path, determining the maximum payment size that can be routed and requiring multi-path sharding for larger transfers.

Statechains and Ark Protocols

Alternative second-layer scaling architectures that enable the non-custodial transfer of individual UTXO ownership off-chain without on-chain blockchain footprint.



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Agustín Carstens' BIS Statement (2020)

BIS General Manager's declaration that CBDCs grant central banks absolute technological control and direct enforcement over who can use currency.

Contrast Western speculative crypto trading with grassroots asset adoption

In the West, tokens are often treated as volatile speculative bets. In countries like Lebanon, Nigeria, and Argentina, citizens facing currency collapse adopt Bitcoin and dollar stablecoins as a survival lifeline to protect savings and receive remittances.

El Salvador Bitcoin Law (Sept 7, 2021)

Historic legislation making Bitcoin legal tender alongside the US dollar, deploying the Chivo wallet and Lightning payment terminals nationwide to bank the unbanked.

Financial Repression

Stealth policy capping interest rates below the rate of inflation while forcing institutions to hold sovereign bonds, quietly liquidating national debt at the expense of savers.

Contrast the two divergent monetary futures confronting human civilization

Centralized CBDCs risk building a financial panopticon of programmable government control over money. Open, decentralized protocols like Bitcoin preserve individual property rights, privacy, and economic freedom.

Matched pairs

Each item on the left goes with the one on the right.

Watchtowers

→ Automated services monitoring the blockchain to punish cheating counterparties when users are offline.

Layered Scaling Synthesis

→ Preserves absolute decentralization at L1 while scaling transaction velocity at L2.

Thiers' Law

→ During severe currency collapses, good money drives out bad money as merchants reject paper.

Fixing the Money

→ Restoring sound, neutral, unforgeable money is the foundational endeavor for global human flourishing.

Step by step

Trace the step-by-step cross-border remittance flow using Lightning Network rails (e.g. Strike).

1. A migrant worker in New York deposits US dollars from their local checking account.
2. The remittance platform automatically converts dollars into Bitcoin satoshis.
3. The payment routes across the global Lightning Network in under 500 milliseconds for sub-cent fees.
4. The receiving app converts satoshis into Mexican pesos and deposits them into family bank accounts.

Self-test

Answer each question from memory, then check your work against the answer key.

1. The Blockchain Trilemma says a blockchain can maximize at most two of which three properties?

- A Decentralization, security, scalability
- B Liquidity, security, cost
- C Divisibility, fungibility, saleability
- D Speed, privacy, custody

2. Who articulated the Blockchain Trilemma?

- A Satoshi Nakamoto
- B Vitalik Buterin
- C Nick Szabo
- D Hal Finney

3. What do Hash Time-Locked Contracts (HTLCs) enable on the Lightning Network?

- A 2-of-2 multisig channel funding
- B Multi-path payment sharding
- C Onion-encrypted routing privacy
- D Trustless multi-hop routing

4. Lightning's routing privacy uses onion encryption modeled after which system?

- A HTTPS/SSL
- B IPsec protocol
- C Tor network
- D VPN tunneling

5. Unlike PayPal or Venmo, what makes the Lightning Network non-custodial?

- A Anyone can run a routing node freely
- B Government controls network access
- C A company holds all user funds
- D KYC verification required to transact

6. What distinguishes a Central Bank Digital Currency (CBDC) from a commercial bank deposit?

- A Decentralized, permissionless protocol
- B Privately issued stablecoin
- C Direct liability of the central bank
- D Direct liability of commercial banks

7. By eliminating physical cash, a cashless CBDC regime lets central banks impose what directly on savings?

A Positive real interest rates
B Negative nominal interest rates
C Fixed currency exchange pegs
D Mandatory capital gains taxes

8. About how many adults worldwide remain completely unbanked, per World Bank data?

A 800 million
B 2.8 billion
C 500 million
D 1.4 billion

9. According to BIS General Manager Agustin Carstens' 2020 statement, what do CBDCs grant central banks?

A Control over the rules governing its use, but no technology to enforce them
B Visibility of aggregate spending only, with no control over how it is used
C Absolute control over the rules governing its use, and the technology to enforce them
D Control limited to interbank settlement, with none over retail use

10. Which term describes the terminal fiat-regime phase where central bank policy is subjugated to monetizing government deficits?

A Currency Debasement
B Quantitative Easing
C Financial Repression
D Fiscal Dominance

11. Ray Dalio's Long-Term Debt Cycle describes a debt super-cycle lasting roughly how many years before a monetary reset?

A 80 to 100 years
B 10 to 20 years
C 40 to 60 years
D 150 to 200 years

12. In Ray Dalio's Long-Term Debt Cycle, what ultimately happens once accumulating debt exhausts central bank rate cuts?

A A prolonged period of austerity and permanent spending cuts
B Massive sovereign debt monetization and a monetary reset
C Governments repay the debt from budget surpluses within a few years
D Rapid economic growth outpaces the debt, so no restructuring or devaluation is needed

13. What term names the terminal phase where government debt is so immense that central bank policy must monetize deficits at suppressed rates?

A Currency Debasement
B Financial Repression
C Quantitative Easing
D Fiscal Dominance

14. Which stealth policy caps interest rates below inflation while forcing institutions to hold sovereign bonds?

A Thiers' Law
B Financial Repression
C Programmable Money
D Fiscal Dominance

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STUDY Broken Money: Why Our Financial System Is Failing Us & How We Can Make It Better in the FlashFeed app flashfeedlearningapp.com/packs/broken-money

Answer key

Lesson 1: Lesson 1: The Ledger Theory and Genesis of Money

1. B Double coincidence of wants

Barter requires each party to want exactly what the other offers; without a common medium, search costs block the trade.

2. C Custodial abuse

Custodial abuse is the architectural risk of centralized ledgers: whoever keeps the ledger can alter or restrict balances at will.

3. A Kept recognizing ownership by oral consensus

Yap islanders tracked title orally; since the ledger, not physical possession, defined ownership, the sunken stone's wealth still counted.

4. D Nick Szabo

Nick Szabo coined unforgeable costliness: money must be costly enough to produce that its supply can't be casually inflated.

5. C Standard of deferred payment

Money's three classical functions are medium of exchange, store of value, and unit of account; deferred payment isn't one of them.

6. D Existing stock divided by annual new production

Stock-to-flow divides accumulated inventory by yearly new production, measuring resistance to supply inflation.

7. B Silver

Silver coinage handled everyday retail transactions due to practical value density, while gold reserved large-scale settlements.

8. A Chemical inertness (nobility)

Gold is the most noble and unreactive metal on the periodic table, so it resists corrosion even after centuries submerged.

9. C Sound money is hoarded and leaves circulation

Gresham's Law: undervalued sound money gets hoarded while overvalued debased money remains in circulation.

10. D Inadvertently undervalued silver at the Mint

Newton's 1717 mint ratio undervalued silver, causing silver to flee circulation and leaving gold as England's de facto standard.

Lesson 2: Lesson 2: The Speed Gap and Banking Centralization

1. C 1840s

The telegraph was invented in the 1840s, the first technology to decouple financial information speed from the physical transport speed of gold.

2. B 1866

The permanent transatlantic cable was completed in 1866, syncing London and New York into one market; 1871 was when Western Union began wire transfers, a different milestone.

3. D The speed gap's transaction-settlement asymmetry

A bank with ample gold in a distant vault but overwhelmed local reserves shows the speed gap: transactions move at wire speed, but physical redemption still moves at transport speed.

4. A Providing deposit insurance to account holders

Clearinghouses netted claims, cut gold transfers by over 95%, and used loan certificates to reconcile balances. Deposit insurance is a 20th-century innovation (like the FDIC), not a 19th-century clearinghouse function.

5. A Western Union

Western Union launched commercial telegraphic money transfers in 1871, proving customers valued speed and reach over holding physical bearer assets.

6. D Holding a fraction of deposits, lending the rest

Fractional reserve banking means holding only a fraction of deposit liabilities as reserves and lending out the rest to expand credit.

7. C 1694

The Bank of England was chartered in 1694 as a private corporation to finance King William III's naval war against France.

8. B Unsecured creditor claim against the bank

Legally, bank deposits become the bank's property; the depositor is only an unsecured creditor, unlike a bailment where title stays with the owner.

9. D Moral hazard

Moral hazard describes banks taking excessive risk because profits are private while the state backstops catastrophic losses.

10. A Multilateral netting

Multilateral netting was the clearinghouse mechanism from the speed-gap era (2.1); reserve pyramiding, the money multiplier, and moral hazard concentrate risk within fractional reserve banking (2.2).

Lesson 3: Lesson 3: War, Defaults, and the Fall of the Gold Standard

1. C Within days of August 1914

All major WWI belligerents suspended gold convertibility within days of the August 1914 outbreak to fund the war through unconstrained printing.

2. A $4.86 per pound

Churchill restored the pre-war parity of $4.86 per pound, overvaluing the pound and forcing deflation and wage cuts.

3. D Prices doubled about every two days

At its peak the mark's collapse in confidence made prices double roughly every two days, wiping out savings -- a mathematical feedback loop, not steady inflation.

4. B Banned private ownership of monetary gold

Executive Order 6102 made private ownership and hoarding of monetary gold illegal for US citizens during the Great Depression.

5. C British gold reserves doubled

Britain's 1931 exit crashed the pound 25% and triggered devaluations and a trade collapse -- it did not double UK gold reserves.

6. D A dollar gold-exchange standard at $35 per ounce

Bretton Woods (1944) pegged the US dollar to gold at $35 per ounce, with other currencies pegged to the dollar.

7. A It must run deficits to supply global liquidity

The Triffin Dilemma says the reserve issuer must run persistent balance-of-payments deficits to supply the world with dollars, eventually diluting its gold reserves.

8. B 1959

By 1959, foreign-held paper dollar claims officially surpassed the market value of the US gold reserve at Fort Knox -- the tipping point for Bretton Woods.

9. A It raised the gold price to lure investors

The Gold Pool dumped gold to suppress the price and defend the $35 peg -- it never raised the price to attract investors.

10. B A run on Fort Knox by the UK and France

The Bank of England and Bank of France ran on US gold reserves in August 1971, forcing Nixon to close the gold window before reserves hit zero.

Lesson 4: Lesson 4: Pure Fiat Mechanics and the Cantillon Effect

1. D Creates a new deposit as a liability

Banks lend first, creating a new deposit liability against the loan asset, rather than passing through existing savings.

2. B Bank of England

The Bank of England's 2014 paper explicitly corrected the textbook multiplier-model description of banking.

3. A Central bank reserves

M0 is central-bank-issued base money (cash and reserves); the other options are commercial bank credit that makes up M2.

4. C Fiscal deficit spending via stimulus checks

Fiscal deficit spending deposits new money directly into household accounts; QE and reserve tools only reshape bank balance sheets.

5. B 0%

The Fed cut reserve requirements to 0%, eliminating mandatory reserves in favor of capital adequacy rules.

6. D New money benefits early recipients before prices rise

The Cantillon Effect describes how early recipients of new money spend it before prices rise, while later receivers face higher prices.

7. A Asset prices rising much faster than CPI

Liquidity injections flow mainly into financial markets, so asset price inflation drastically outpaces official CPI.

8. C Finance sector dominating profits over manufacturing

Financialization is the structural shift where finance expands to dominate corporate profits, GDP, and capital allocation.

9. B Productivity kept rising while real pay flatlined

Post-1971, U.S. worker productivity kept climbing while real hourly compensation stagnated, a widely cited decoupling.

10. A Time preference

Shortened time preference means people favor immediate consumption over multi-generational investment as money loses value; liquidity preference and risk tolerance are distinct economic concepts.

Lesson 5: Lesson 5: Global Reserve Hegemony: Eurodollars & Petrodollars

1. D US dollar deposit outside the US

A Eurodollar is a US dollar deposit held at a bank outside US regulatory jurisdiction, not a crypto asset, bond, or futures contract.

2. B Soviet Union

The Soviet Union placed dollar earnings in banks like Moscow Narodny Bank to avoid US asset freezes, launching the Eurodollar market in the 1950s.

3. A Capped domestic deposit interest rates

Regulation Q capped interest banks could pay on domestic deposits, so corporations moved dollars to uncapped London Eurodollar accounts for higher yields.

4. C Overnight deposits funding multi-year loans

Eurodollar banks fund multi-year emerging-market loans with short-term overnight interbank deposits, a mismatch exposed in the 1982 and 1997 debt crises.

5. D Provide dollar liquidity to foreign banks

When foreign banks can't roll over maturing Eurodollar debt, they dump US assets in panic; Fed swap lines supply dollars to prevent this from crashing US markets.

6. A Petrodollar System

The petrodollar system: Gulf oil was already dollar-denominated, and the 1974 US-Saudi security-and-finance arrangements (including Saudi purchases of US Treasury debt) cemented structural global dollar demand — distinct from Bretton Woods or the Plaza Accord.

7. B Global corporate tax harmonization

Corporate tax harmonization isn't discussed; neocolonialism works through inflation export, IMF austerity mandates, and Original Sin forcing dollar-denominated debt.

8. C CFA Franc zone

The CFA Franc zone requires six Central African nations to peg to the Euro and deposit reserves in the French Treasury, unlike the petrodollar or Bretton Woods systems.

9. B Physical gold bullion

Gold purchases surged past 1,000 metric tons a year after 2022, since bullion can't be frozen like Treasuries, SDRs, or foreign-currency reserves held in Western institutions.

10. C Multipolar currency settlement

Multipolar currency settlement uses local currencies, bilateral clearing, and gold, unlike unipolar dollar clearing which routes trade through US correspondent banks.

Lesson 6: Lesson 6: Digital Scarcity and the Bitcoin Architecture

1. A Internet speed

Bitcoin merges gold's unforgeable scarcity with telecommunications-speed transfer, closing the 180-year gap between hard money and fast money.

2. B Spending a digital asset twice

The double-spend problem is a digital token being copied and spent more than once; Bitcoin solves it via decentralized consensus instead of a trusted company.

3. C 2,016 blocks

The Difficulty Adjustment runs every 2,016 blocks (about two weeks) to keep the average block time near 10 minutes regardless of total mining power.

4. D Hal Finney

Cryptographic pioneer Hal Finney received the first Bitcoin transaction and, in 2010, predicted Bitcoin would scale as a layered reserve asset.

5. D Existing coin holdings

PoW influence depends on ongoing energy and hardware competition, not on existing coin holdings -- that basis belongs to Proof-of-Stake instead.

6. C 21 million

Bitcoin's protocol caps total issuance at 21 million coins, enforced by independent validating full nodes worldwide.

7. B Unspent transaction outputs

UTXO stands for Unspent Transaction Output -- Bitcoin consumes prior outputs as inputs and creates new unspent outputs, unlike an account-balance model.

8. A Satoshi

Each bitcoin divides into 100,000,000 satoshis (sats), letting the network price micro-purchases regardless of the aggregate coin value.

9. B Users running full nodes

Ordinary users running inexpensive full nodes refused to validate the corporate-backed SegWit2x blocks, keeping consensus power decentralized.

10. D Network effect

This compounding advantage is called the network effect, which establishes Bitcoin as the global Schelling point for digital money.

Lesson 7: Lesson 7: Layered Scaling, CBDCs, and the Monetary Horizon

1. A Decentralization, security, scalability

Vitalik Buterin's Trilemma names decentralization, security, and scalability. Divisibility/fungibility/saleability are properties of money itself, not the blockchain engineering tradeoff.

2. B Vitalik Buterin

The lesson credits Vitalik Buterin with articulating the Trilemma. Satoshi, Szabo, and Finney are other foundational crypto figures but not the source of this framing.

3. D Trustless multi-hop routing

HTLCs let payments route safely across intermediary nodes without trusting them. Onion encryption, multisig funding, and payment sharding are separate Lightning mechanisms.

4. C Tor network

Lightning uses onion encryption similar to Tor, so intermediate nodes only know the previous and next hop. VPNs, SSL, and IPsec are unrelated encryption schemes here.

5. A Anyone can run a routing node freely

Lightning is open-source and permissionless, so anyone can run a node without corporate approval. The other options describe custodial or restricted fintech-style control, the opposite of Lightning.

6. C Direct liability of the central bank

A CBDC is a direct digital liability of the central bank itself, not a commercial bank. It is also centralized, unlike a decentralized protocol or a privately issued stablecoin.

7. B Negative nominal interest rates

Without cash as an escape valve, central banks can push deeply negative nominal interest rates on savings to force consumption. Exchange pegs and tax policy are separate tools.

8. D 1.4 billion

The lesson cites World Bank data showing over 1.4 billion adults are completely unbanked, excluded from the traditional financial system.

9. C Absolute control over the rules governing its use, and the technology to enforce them

In an October 2020 IMF panel, Carstens said that with a CBDC the central bank would have absolute control over the rules and regulations determining its use, plus the technology to enforce them. He did not limit that control to aggregate data or interbank settlement, nor say it lacked enforcement.

10. D Fiscal Dominance

Fiscal Dominance is the terminal phase where debt monetization overrides central bank independence. Financial Repression is a related but distinct policy of capping rates below inflation.

11. A 80 to 100 years

Dalio's model spans roughly 80 to 100 years, ending in sovereign debt monetization and a monetary reset.

12. B Massive sovereign debt monetization and a monetary reset

The cycle culminates in monetizing runaway debt and resetting the monetary system once rate cuts are exhausted.

13. D Fiscal Dominance

Fiscal Dominance is the terminal phase where debt subjugates central bank policy to monetizing runaway deficits.

14. B Financial Repression

Financial Repression quietly liquidates national debt at savers' expense by capping rates below inflation.

Sources

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