Follow the Money: Revenue Mechanics in Digital Finance

Digital Finance Intensive: Day 5A

Prof. Dr. Joerg Osterrieder

Digital Finance – Intensive Course

Revenue mechanics are the structural force that determines who builds what and why in digital finance.

The Coinbase Puzzle

Student A: "I looked up Coinbase. $3.1 billion in annual revenue. Sounds like a great business."

Student B: "Same report. Net loss: $1.1 billion. So... not great?"

Student A: "How do you lose money when you earn three billion dollars?"

Student B: "Maybe they spend four billion? But on what? No factory. No inventory."

Student A: "And where does the $3.1 billion even come from? Nobody pays Coinbase a salary."

Professor: "Good questions. Let us find out. This is what today is about."

Coinbase is the largest regulated crypto exchange in the US. Understanding its revenue model is a master key to the entire digital finance industry.

Coinbase: $3.1B Revenue, $1.1B Net Loss – The Raw Facts

Coinbase Annual Report 2022: Selected Figures

Total Revenue

$3.1B

Transaction revenue: $2.2B
Other revenue: $0.9B

Total Operating Costs

$4.2B

Technology: $1.6B
Sales & marketing: $1.0B
G&A: $1.0B
Restructuring: $0.6B

Context

Employees: ≈3,400
Countries: 100+
Verified users: 108M
Assets on platform: $80B

Net Loss: $1.1B $\Rightarrow$ Revenue \$3.1B − Costs \$4.2B = $-\$1.1B$

Source: Coinbase Global Inc. Annual Report 2022. Figures rounded.

These numbers are real. The question is not whether they are correct but what they tell us about how Coinbase makes money and why it does not keep more of it.

Three Questions Before We Continue

Q1: Where does the money go?

Coinbase earns $3.1B. Identify at least three groups that receive some of it.

Hint: think about who does work on Coinbase's behalf.

Q2: Is this a good business?

Revenue $3.1B, loss $1.1B. Name two things that would make this business better and two that would make it worse.

Q3: What costs more than they earn?

They spent $4.2B. Technology alone was $1.6B. What does a crypto exchange need that costs that much to build and run?

Discuss in pairs – 3 minutes. We will hear answers before moving on.

No framework required yet. Use your own judgment. We will revisit these answers at the end of the lecture.

What This Lecture Equips You to Do

Armed with the Coinbase puzzle, here is the toolkit you will leave with:

1. **Identify** the three revenue layers in digital finance and classify any company into one or more layers [Understand]
2. **Calculate** the revenue model of a stablecoin issuer from public filings [Apply]
3. **Explain** why Transaction Cost Economics predicts DeFi disintermediation [Apply]
4. **Compare** where value accrues in Web2 versus Web3 platform stacks [Analyze]
5. **Evaluate** whether the fat protocol thesis holds for a given company [Evaluate]

One sentence to carry forward: For every technology we study – who pays, how much, to whom, and in exchange for what?

Revenue mechanics are not a finance detail. They are the structural force that determines who builds what in digital finance and why.

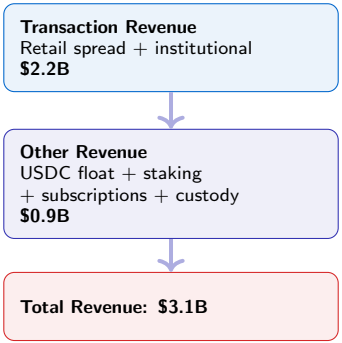
Coinbase Revenue: Where the $3.1B Comes From

Transaction Revenue: $2.2B (71%)

- Retail spread: Coinbase charges 1.49–3.99% above mid-market on buys and sells
- Institutional clients pay a flat 0.05–0.25% commission
- Retail volume is smaller but retail spreads are 10× higher than institutional

Other Revenue: $0.9B (29%)

- **USDC reserve sharing:** Circle pays Coinbase ≈50% of USDC float income – Coinbase's fastest-growing revenue stream
- **Staking rewards:** Coinbase holds and stakes crypto on behalf of users, keeping a cut of the yield
- **Coinbase One:** $29.99/month for zero-commission trading
- **Custody and data fees:** institutional clients pay for secure custody and API access



Retail spread is Coinbase's primary revenue but also its most fragile: volume collapses in bear markets and competitors are racing to zero commissions. USDC float is more stable but depends on interest rates.

Coinbase Costs: What Eats the $3.1B

Technology and Development: $1.6B

- Engineering salaries for thousands of developers
- Cloud infrastructure running 24/7 matching engines
- Security and compliance systems – a regulatory requirement
- Research into new assets and custody solutions

Sales, Marketing, and G&A: $2.0B

- Customer acquisition, especially in bull markets
- Legal and regulatory costs across 100+ jurisdictions
- Restructuring charges from 2022 headcount reduction

Key Insight: The Cost Problem

Coinbase costs are largely **fixed and regulatory-driven**:

- Compliance in every country is mandatory regardless of revenue
- Security spend cannot fall below a minimum threshold
- Engineering talent is expensive and mobile

The 2022 problem: Revenue fell 75% from the 2021 peak as crypto prices collapsed. Costs fell much less. Hence the $1.1B net loss.

The 2024 recovery: Revenue rebounded to $> \$6B$ as Bitcoin hit new highs. Same cost base, $> \$1B$ net income.

This is the core tension in exchange business models: revenue is highly volatile (tied to crypto prices and volumes), while regulatory and technology costs are sticky. Operating leverage cuts both ways.

Three Revenue Patterns in the Coinbase Data

Looking at Coinbase's revenue sources, three distinct patterns emerge:

Pattern 1: Earn by Running the Network

Validators earn gas fees to process Coinbase's transactions.

Chainlink oracles earn fees to price assets.

Revenue exists whether or not any user trades.

Pattern 2: Earn a Toll on Transactions

The USDC smart contract earns float automatically.

Aave's lending pool earns spread on every loan.

Revenue flows from the protocol rules, not from a sales team.

Pattern 3: Earn From the User Relationship

Coinbase charges retail users 1.49–3.99% above mid-market.

Coinbase One subscribers pay $29.99/month.

Revenue flows from owning the customer interface.

These three patterns appear in every digital finance company and in traditional finance too. The names change but the economic structure does not.

The Revenue Layer Framework: Formalising the Three Patterns

- **Coinbase spans all three:** it pays infrastructure (gas fees), earns at protocol (USDC float share), and earns at application (retail spread)
- A single user trade can generate revenue at all three layers simultaneously
- The framework is your diagnostic tool for every company we study today

Keep this framework accessible. For every company in today's activities, ask: which layer is this revenue from, and how stable is it?

Classify Robinhood: Which Revenue Layer?

What you know about Robinhood:

- Commission-free equity and crypto trading in the US
- Revenue: ≈$1.9B in 2024
- Largest revenue source: **net interest income** – Robinhood earns yield on un-invested customer cash
- Second source: **payment for order flow (PFOF)** – market makers pay Robinhood for access to its order flow
- Third source: **Robinhood Gold** subscription ($5/month), margin lending, crypto spread
- Employees: ≈1,000 (vs Coinbase's 3,400)

Infrastructure Layer?
Earn by running the network.

Protocol Layer?
Earn a toll on transactions.

Application Layer?
Earn from the user relationship.

Assign each Robinhood revenue source to a layer.

Students: classify each of Robinhood's three revenue streams before the next slide reveals the breakdown. Write your answers first, then compare with a neighbour.

Robinhood Revealed: Mostly Application, One Protocol-Adjacent Stream

Robinhood Revenue Layer Analysis

Application Layer (Primary)

PFOF: market makers pay Robinhood for access to its order flow.

Robinhood Gold: $5/month subscription.

Crypto spread: markup on retail trades.

This is the user-relationship toll.

Protocol-Adjacent (Large)

Net interest income: yield on uninvested customer cash.

Margin lending: earns the spread on borrowed funds.

Structurally identical to Circle's float model.

Infrastructure

Near zero for Robinhood.

Robinhood *pays* infrastructure (clearing, exchange fees). It does not earn from it.

Key insight: Robinhood appears free but monetises information (PFOF) and float, not direct user fees. The application layer is invisible to most users.

Robinhood's $1.9B revenue with ≈1,000 employees gives revenue-per-employee of ≈$1.9M – roughly 3x Coinbase's ratio. Fewer people, more automation, less regulatory overhead.

Traditional Finance: The Same Three Layers

Layer	Traditional Finance	Digital Finance	Revenue Type
Infrastructure	Central bank, SWIFT, CLS, ACH, exchange matching engine	Ethereum validators, Chainlink oracles, Infura nodes	Gas fees, staking yield, clearing fees
Protocol	Card networks (Visa/Mastercard), interbank market, prime brokerage	Uniswap, Aave, USDC float (Circle/Coinbase)	Interchange (1–2%), lending spread, protocol fees
Application	Retail banks, wealth managers, brokers	Coinbase, MetaMask, Revolut, Robinhood	Spread, subscription, advisory fee, PFOF

- **The names change**; the economic structure does not
- Key difference: DeFi protocol rules are public and auditable; traditional rules are opaque and negotiated
- Key similarity: the application layer captures most retail margin in both systems

Visa earns interchange (≈0.10%) and network fees on every card transaction. Uniswap earns swap fees (0.30%) distributed to liquidity providers. Both are protocol-layer tolls on the movement of value.

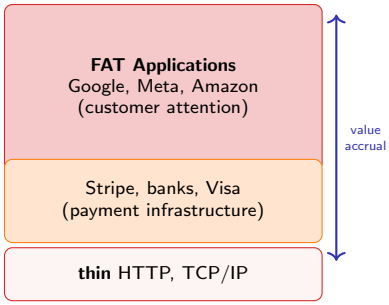
Fat Protocol: How HTTP, Visa, and Stripe Split the Value

The Web2 Stack – a single online payment:

1. **HTTP / TCP-IP** carries the request — earns: $0
2. **Stripe** processes the payment (2.9% + $0.30) — earns: small
3. **Visa / Mastercard** network fee (0.10–0.15%) — earns: small
4. **Issuing bank** interchange (1.5–2.0%) — earns: moderate
5. **Google / Meta** drove the traffic via ads — earns: largest share

Conclusion: The open protocol (HTTP) earns nothing. The applications capturing user attention capture the value. **Thin protocols, fat applications.**

Web2 Value Stack



Joel Monegro's 2016 "Fat Protocol" thesis argued Web3 would invert this: protocols would capture more value than applications because they embed the native token. Is this empirically true?

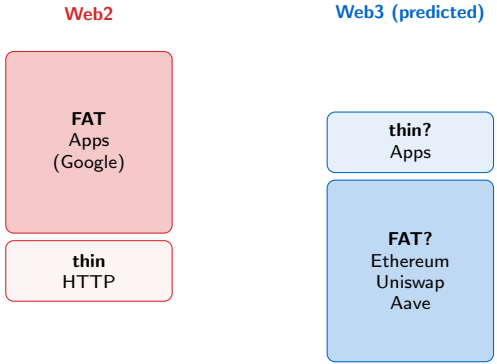
From HTTP to Ethereum: Who Captures the Value in Web3?

The Fat Protocol Prediction:

- Ethereum replaces HTTP – but ETH has a market cap of $300B+
- Aave and Uniswap replace Stripe – but they also have multi-billion token valuations
- Applications should be "thin" – yet **Coinbase has a $50B+ market cap**

The mechanism:

Protocol usage requires the native token (ETH for gas). As apps are built, protocol token demand rises. Protocol tokens should appreciate faster than the applications built on them.



The fat protocol thesis was bold and counterintuitive in 2016. Whether it is empirically correct is a separate question – one that professional investors actively debate.

Counter-Evidence: Where the Fat Protocol Thesis Breaks Down

Evidence against the thesis:

- Coinbase (application) has $50B+ market cap; Uniswap TVL far exceeds UNI token market cap
- UNI token has no cash flow rights unless the "fee switch" is activated – value is purely speculative
- Centralised exchanges still capture 80%+ of crypto trading volume and most industry profit
- Most DeFi protocols generate protocol revenue but do not distribute it to token holders – value leaks to LPs instead

Evidence for the thesis:

- ETH market cap grew from near zero to $300B+ – more than most Web2 protocols ever accumulated
- Every new DeFi app built on Ethereum creates demand for ETH (for gas) – composability drives protocol demand
- Ethereum staking yield (3–5% APY) is a real cash return the protocol pays its infrastructure providers

Analyst verdict: Base-layer protocols (L1 blockchains) may accumulate value. Application-layer protocols (Uniswap, Aave) have weaker structural claims.

Apply the revenue layer framework: does the protocol earn revenue, or merely enable it? ETH earns gas fees. UNI token does not (yet). That distinction drives the fat protocol debate.

Circle USDC: Would You Invest $10M in This Business?

What you know about Circle:

- Issues USDC, the second-largest stablecoin (≈$40B supply)
- Every USDC token is backed 1:1 by cash and short-term US Treasuries
- Circle does **not pay interest** to USDC holders
- Revenue in 2024: ≈$1.7B on $34B average USDC supply

Your task: You have $10M to allocate.
Would you invest in Circle equity?

Name one reason to invest and one reason to pass. Form a view before you see the numbers.

Discuss in pairs:

What is the **source** of Circle's revenue?

What is the **key risk** you would want to understand before committing $10M?

We will calculate the model on the next slide.

3 minutes – form a view.

Circle filed for a US IPO (S-1, 2024). Professional investors evaluated this exact decision. Your intuition now will make the numbers more meaningful when you see them.

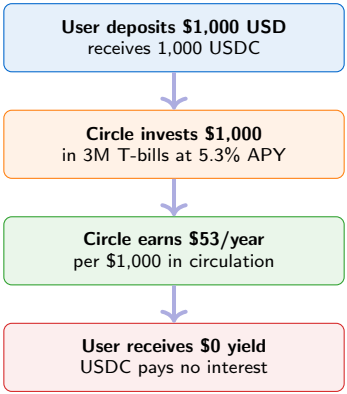
The Float Model: How Circle Makes $1.7B Doing Nothing

Step by step:

1. User deposits USD, receives 1,000 USDC tokens
2. Circle invests the USD in 3-month US Treasury bills (yield $\approx$5.3% in 2023–2024)
3. Circle keeps the entire yield
4. USDC holders receive zero yield
5. When the user redeems, they get their USD back – Circle returns principal, keeps what it earned

This is not new:
Retail banks do the same with current accounts. Circle is a **narrow bank** with a crypto front end.

Tether (USDT) runs the identical model with $> \$100B$ supply and fewer than 100 employees.



Circle's revenue is not from a product or service. It is from the float: the gap between what it pays holders (zero) and what it earns on their deposits. This is structurally identical to a demand-deposit bank.

Circle Revenue Math: Calculate It Yourself

Inputs (2023–2024)

USDC supply: $40B

US 3M T-bill yield: 5.3%

Revenue share with Coinbase: ≈50%

(Coinbase distributes USDC; Circle splits the float income)

Your Calculation

Gross: $40B × 5.3% = ?

Coinbase share: half of gross

Circle net: ?

Operating costs: ≈$300M

EBIT: ?

Rate Risk

What happens when rates return to 2%?

What happened in 2021 when rates were near zero?

(Circle earned <$100M in 2021 on the same operations)

- **Answer:** Gross ≈$2.12B; Coinbase share ≈$1.06B; Circle net ≈$1.06B; EBIT ≈$760M
- **Rate sensitivity:** If yield drops to 2%, gross halves to ≈$800M and EBIT approaches zero

The calculation takes 30 seconds. Understanding why this business is fragile takes 30 minutes. Focus on the rate sensitivity, not the arithmetic.

Would You Invest? Three Threats to the Circle Model by 2027

Threat 1: Rate Normalisation

- If Fed funds rate returns to 0–2%, T-bill yield collapses
- Circle's revenue falls from \$1.7B to <\$400M with zero change in operations
- This is not speculative – it happened in 2020–2021

Threat 2: Yield-Bearing Stablecoins

- New protocols (Ondo Finance, Mountain Protocol) pass T-bill yield directly to holders
- If users can earn 5% on a competing stablecoin instead of 0% on USDC, why hold USDC?
- Regulatory barriers protect Circle for now – MiCA and US stablecoin law may change this

Threat 3: Concentration Risk

- Coinbase receives ≈50% of Circle's float revenue
- If Coinbase renegotiates or is acquired, Circle's economics change fundamentally
- Both parties know it – this is a symbiotic relationship with power on both sides

Return to your decision: Does the float model justify a multi-billion valuation given these three threats? What would you pay for a business that earns \$1.7B when rates are high and near zero when they are not?

Circle's S-1 filing lists interest rate risk as the primary business risk – explicitly, at the top of the risk factors section. That placement is unusual and intentional.

Transaction Cost Economics: One Slide

Ronald Coase (1937):

"Firms exist because markets have friction. The boundary of the firm is set by the point where internal transaction costs exceed external market costs."

Applied to finance:

- **Search costs:** finding a willing counterparty
- **Verification costs:** confirming identity, credit, collateral
- **Enforcement costs:** ensuring the deal is honoured

Banks exist because they reduce all three costs at scale. Their margin *is* the transaction cost they eliminate.

What blockchain changes:

- **Search:** public order books and open liquidity pools – near-zero search cost
- **Verification:** cryptographic proofs replace credit checks (in permissionless DeFi)
- **Enforcement:** smart contracts self-execute; no court needed

The economic prediction: when code reduces transaction costs below the bank's margin, disintermediation occurs.

The limit: blockchain introduces new costs (gas, oracle risk, smart contract bugs). Net savings depend on the use case.

This is the single most important theoretical lens for DeFi: it is not a technology story, it is a transaction cost story. Banks are expensive trust machines. Blockchains are cheaper trust machines for specific use cases.

Synthesis: Pick a Stablecoin Issuer, Build the Revenue Model

Exercise (10 minutes): Pick one issuer below. Build a back-of-envelope annual revenue model. State assumptions explicitly.

Tether (USDT)

Supply: $> \$100B$
Employees: < 100
HQ: British Virgin Islands
Reserve: T-bills + Bitcoin

PayPal USD (PYUSD)

Supply: $\approx$\$1B
Issuer: Paxos Trust
Distributor: PayPal
Reserve: T-bills + cash

DAI/USDS (Sky)

Supply: $\approx$\$5B
Collateral: crypto + RWAs
Governance: MKR/SKY hol
ers
Revenue: Stability Fee

Ondo USDY

Supply: $\approx$\$500M
Yield to holders: 5%+
Issuer: Ondo Finance
Reserve: T-bills (direct)

Deliver: revenue estimate, key assumption, biggest risk, and revenue layer classification.

There is no correct answer. The goal is to see how different assumptions about supply, yield, and costs produce radically different revenue estimates for structurally similar businesses.

Revenue Model Comparison: Five Companies, Five Models

Company	Revenue Mechanism	Revenue (2024)	Layer	Key Risk
Coinbase	Retail spread (1.5–3.99%), USDC float share, staking, subscription	∼$6B	App + Protocol	Regulation, bear markets
Robinhood	PFOF, net interest income, Gold subscription	∼$1.9B	App (primary)	PFOF ban, rate sensitivity
Circle	Reserve float (T-bill yield on USDC collateral)	∼$1.7B	Protocol/Issuer	Rate drop, yield-bearing competition
Uniswap	LP fees (0.30% per swap) + front-end fee (0.15%)	LP: ∼$1.5B; Labs: ∼$100M	Protocol + App	Competing DEXes, MEV
M-Pesa	Transaction fees (0.5–6%), agent float, B2B APIs	∼$1.2B	Application	Regulation, fintech competition

Key observation: Same industry, five fundamentally different revenue logics. The framework is your diagnostic, not the company's marketing.

No two revenue models are structurally identical. The safest assumption when analysing a new digital finance company: it has probably invented a revenue mechanism you have not seen before.

Who Captures Most Value? It Depends on Operating Leverage

Application layer: highest retail margin, most volatile

- Coinbase's retail spread is its largest revenue line but collapses in bear markets
- Revenue per trade is high; fixed costs are also high
- High operating leverage – small volume change produces large profit swing

Protocol layer: stable fee income, winner-takes-most

- Uniswap's TVL flywheel: liquidity attracts volume; volume attracts more liquidity
- Same two-sided market dynamic as Visa's card network
- Once established, switching costs protect market share

Infrastructure: stable yield, lowest upside

- Validators earn gas and staking yield regardless of market direction
- Low margin, low risk, highly predictable
- Strategically important but not where most value accumulates

The answer to our opening question:

Coinbase earned $3.1B because it owns the retail user relationship (application layer). It lost $1.1B because its technology and compliance costs are fixed while its revenue is cyclical. Revenue layers explain business model risk.

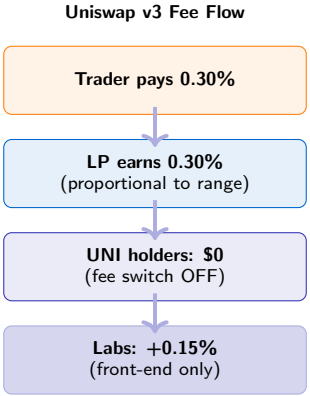
Return to your Day 5 framework sheet: revenue layer analysis is Canvas Question 1 applied systematically. Every revenue source has a payer, a mechanism, and a risk.

Appendix: Uniswap Revenue Deep Dive

Who earns what in Uniswap v3?

- **Liquidity Providers:** Earn swap fees proportional to their share of the pool within the active price range. In v3, LPs concentrate liquidity in chosen price ranges for higher fee efficiency.
- **Uniswap Labs:** Earns a 0.15% front-end fee on swaps executed via app.uniswap.org on select pairs (since October 2023).
- **UNI Token Holders:** Currently earn nothing. A "fee switch" vote could redirect 10–20% of LP fees to the protocol treasury.

Governance token paradox:
UNI has a multi-billion dollar market cap despite generating zero cash flows for holders. Valuation rests entirely on the option to activate the fee switch.



Uniswap Labs filed for the 0.15% front-end fee in October 2023 – the first time the company captured direct protocol revenue after 5 years of building the most-used DEX in history.

Appendix: Liquidity Provider Economics and Impermanent Loss

What LPs earn:

- Proportional share of all swap fees in their active price range
- Example: deposit \$10,000 in ETH/USDC pool (0.30% tier)
- If pool does \$10M daily volume: daily LP fees = \$30,000
- Your share at 0.1% of pool = \$30/day $\approx$ 11% APY

What LPs risk – Impermanent Loss:

- If ETH price moves significantly, an LP ends up with more of the cheaper asset
- At 2$\times$ price move: IL $\approx$ 5.7% relative to holding
- At 5$\times$ price move: IL $\approx$ 25.5%
- IL is only realised on withdrawal; fees accrue while you are in the pool

LP Economics Summary

Upside

+ Swap fee income
+ Liquidity mining rewards
+ LP tokens usable as collateral

Downside

– Impermanent Loss (IL)
– Smart contract risk
– Oracle manipulation
– Concentrated range: zero fees if out of range

Active LP management in v3 is closer to market-making than passive investing. High fee income in volatile markets often fails to compensate for impermanent loss – invisible in average APY figures.

Summary: Three Layers, One Framework, One Open Question

Infrastructure earns stability

Gas fees and staking yield accrue regardless of market direction. Lowest margin, lowest risk.

Protocol earns volume

Swap fees and lending spreads scale with usage. Winner-takes-most via the liquidity flywheel.

Application earns relationship

Highest retail margin, most volatile. User trust is the moat, not the technology.

TCE: Banks exist because trust is expensive. Blockchains are cheaper trust machines – for use cases with the right cost-benefit profile.

The open question for Day 6: Coinbase earns at the application layer by owning the user interface. What happens when DeFi wallets become indistinguishable from exchange apps? Who owns the user then?

Revenue layer analysis is the fastest way to understand whether a digital finance business is a technology story, a trust story, or a regulatory arbitrage story.