Introduction to the Economics of Digital Finance

L01: Setting the Economic Framework

Economics of Digital Finance

BSc Course

Lesson Overview

Today's Topics

1. What is digital finance? (Economic definition)
2. Historical evolution of money and payments
3. The four economic lenses framework
4. Why economists should care

Learning Objectives

- Define digital finance from an economic perspective
- Distinguish economic from technical questions
- Apply multiple economic frameworks to digital finance

This course examines digital finance through economic theory, not technical implementation

What is Digital Finance?

Economic Definition
Digital finance encompasses financial services and instruments that:

- Rely on digital infrastructure for value transfer
- Create new forms of money and payment systems
- Enable disintermediation or re-intermediation

Key Distinction

- Technical: *How does it work?*
- Economic: *What incentives drive adoption?*

Scope of Digital Finance

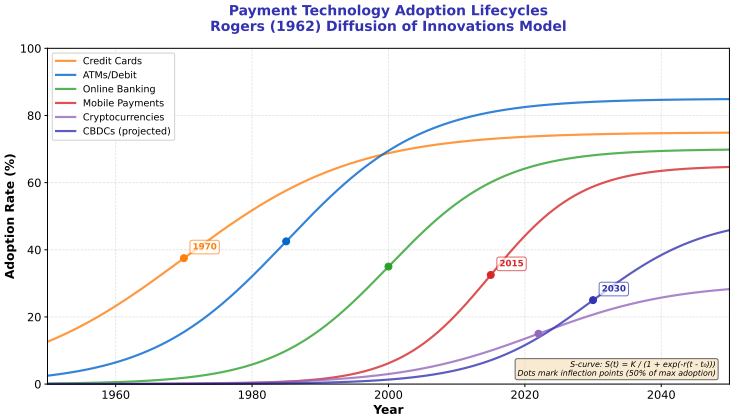
- Cryptocurrencies (digital assets using cryptography) and stablecoins (cryptocurrencies pegged to stable assets like USD)
- Central Bank Digital Currencies (CBDCs)—official digital money issued by central banks
- Digital payment systems
- Decentralized Finance (DeFi)—financial services on blockchain without banks
- Tokenized assets (traditional assets represented as digital tokens on blockchain)

Economic Questions

- Who captures value?
- What are the welfare effects?
- How does regulation affect outcomes?

Economics analyzes incentives, efficiency, and welfare—not code or protocols

Historical Evolution of Payment Methods



Each transition was driven by economic forces: reducing transaction costs (time, fees, and friction in exchanges), enabling trade at scale

The Economics of Money: Three Functions

Classical Functions of Money

1. Medium of Exchange

- Solves double coincidence of wants
- Reduces transaction costs
- Requires acceptability

2. Unit of Account

- Simplifies price comparisons
- Enables economic calculation
- Reduces cognitive costs

3. Store of Value

- Preserves purchasing power
- Enables intertemporal trade
- Requires stability

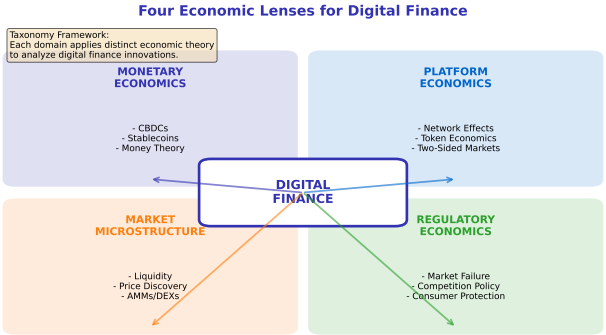
Digital Finance Challenge

Do cryptocurrencies fulfill these functions?

- Bitcoin: Limited as medium (volatility—rapid, unpredictable price swings)
- Stablecoins: Better but trust issues
- CBDCs: Designed to fulfill all three

Jevons (1875), a foundational economist: "Money is what money does"—evaluate money by how well it performs these three functions

Four Economic Lenses for Digital Finance



This course applies all four lenses to understand digital finance comprehensively

Lens 1: Monetary Economics

Key Questions

- How do digital currencies affect money supply?
- What happens to monetary policy transmission?
- Can cryptocurrencies replace fiat money (government-issued currency like dollars)?

Theoretical Tools

- Quantity theory of money
- Money demand functions
- Currency substitution models

Key Concepts

- Seigniorage and its distribution
- Velocity of money in digital systems
- Gresham's Law (bad money drives out good)

Applications

- CBDC design trade-offs
- Stablecoin stability mechanisms
- Dollarization vs. crypto-ization

Lessons 2-3 focus on monetary economics of digital currencies and CBDCs

Lens 2: Platform Economics

Key Questions

- Why do some cryptocurrencies dominate?
- How do network effects shape adoption?
- What determines token value?

Theoretical Tools

- Network effects models
- Two-sided market theory
- Mechanism design

Key Concepts

- Critical mass and tipping points
- Winner-take-all dynamics
- Platform governance

Applications

- Token economics design
- Blockchain adoption dynamics
- DeFi protocol competition

Lessons 4-5 apply platform economics to payments and token systems

Lens 3: Market Microstructure

Key Questions

- How do crypto markets discover prices?
- Why are spreads wider in crypto?
- How do Automated Market Makers (AMMs) differ from order books?

Theoretical Tools

- Bid-ask spread models
- Liquidity provision theory
- Information asymmetry models

Key Concepts

- Market making and inventory risk
- Price impact and slippage
- Impermanent loss in AMMs

Applications

- Decentralized Exchange (DEX) vs. Centralized Exchange (CEX) efficiency
- MEV (Maximal Extractable Value)
- Market manipulation detection

Lesson 6 provides deep dive into market microstructure of digital finance

Lens 4: Regulatory Economics

Key Questions

- What market failures justify regulation?
- How should crypto be classified legally?
- What are costs of regulatory arbitrage?

Theoretical Tools

- Market failure analysis
- Public interest vs. capture theory
- Cost-benefit analysis

Key Concepts

- Asymmetric information
- Systemic risk externalities
- Consumer protection rationale

Applications

- Principles vs. rules-based regulation
- Regulatory sandbox design
- International coordination

Lesson 7 applies regulatory economics; Lesson 8 synthesizes all four lenses

Why Economists Should Study Digital Finance

Disruption Potential

- $15+ trillion digital payments by 2027
- 130+ countries exploring CBDCs
- DeFi challenging traditional finance

Policy Relevance

- Central banks need economic analysis
- Regulators need welfare frameworks
- Governments need tax policy guidance

Theoretical Innovation

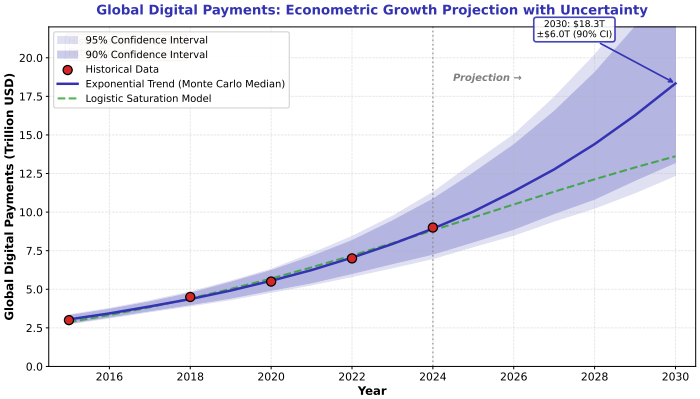
- New forms of money creation
- Novel market mechanisms (AMMs)
- Programmable financial contracts

Research Opportunities

- High-frequency blockchain data
- Natural experiments in adoption
- Cross-country regulatory variation

Digital finance is a laboratory for testing economic theories with real-world data

The Scale of Digital Finance Transformation



COVID-19 accelerated digital payment adoption; economists must understand these trends

Economic Questions vs. Technical Questions

Technical Questions

- How does proof-of-work function?
- What is a smart contract?
- How do hash functions secure data?
- What programming languages are used?

Focus: Mechanisms and implementation

Economic Questions

- Why do miners invest in PoW systems?
- How do smart contracts reduce costs?
- What incentives secure the network?
- Who benefits from decentralization (distributing control away from central authorities)?

Focus: Incentives and welfare

This course focuses on economic analysis, not technical implementation

You don't need to understand HOW proof-of-work or hash functions work—just know they exist so you can see what economists focus on instead

Key Takeaways

What We Covered

1. Digital finance defined economically
2. Historical context of money evolution
3. Four economic lenses framework
4. Why economic analysis matters

Looking Ahead

- L02: Monetary economics of crypto
- L03: CBDCs and monetary policy
- L04: Payment systems economics
- L05-L08: Further applications

Core Message

Digital finance raises fundamental economic questions about money, markets, platforms, and regulation. This course provides the analytical tools to address them.

Next lesson: Monetary Economics of Digital Currencies

Key Terms

Blockchain Distributed digital ledger recording transactions across many computers.

CBDC Central Bank Digital Currency; digital form of official currency.

Cryptocurrency Digital asset using cryptography, not issued by government.

Decentralization Distribution of power away from single authority to many participants.

DeFi Decentralized Finance; blockchain financial services without intermediaries.

Digital Finance Financial services relying on digital infrastructure for value transfer.

Disintermediation Removal of intermediaries like banks from transactions.

Externality Cost or benefit affecting parties outside a transaction.

Fiat Money Government-issued currency not backed by physical commodity.

Liquidity How easily an asset trades without affecting its price.

Market Failure When free markets fail to allocate resources efficiently.

Market Microstructure How trading mechanisms affect price formation and efficiency.

Network Effects Value of a service increases as more users join.

Seigniorage Profit from issuing currency above production cost.

Stablecoin Cryptocurrency designed to maintain stable value, pegged to fiat.

Token Digital unit of value representing assets, rights, or access.

Transaction Costs All exchange costs: time, fees, search, and friction.

Two-Sided Market Platform connecting distinct groups providing mutual network benefits.

Volatility Degree of price fluctuation; high volatility means rapid changes.

Welfare Total societal well-being; measures efficiency plus fairness.

Master these terms before proceeding to subsequent lessons.

Further Reading

Foundational Papers

- Brunnermeier & Niepelt (2019): "On the Equivalence of Private and Public Money"
- Catalini & Gans (2020): "Some Simple Economics of the Blockchain"

Policy Reports

- BIS Annual Economic Report (2022), Chapter III
- IMF Global Financial Stability Report (2023)
- FSB Crypto-asset Reports (2022-2023)

All readings available on course platform