Payment Systems Economics

L04: Economics of Value Transfer

Economics of Digital Finance

BSc Course

Lesson Overview

Today's Topics

1. Economics of payment systems
2. Network effects and adoption
3. Two-sided market theory
4. Cross-border payment challenges
5. Financial inclusion

Learning Objectives

- Apply network economics to payments
- Analyze interchange fee economics
- Understand correspondent banking costs
- Evaluate digital solutions

Payment systems are infrastructure for economic activity; their economics matter

Economics of Payment Systems

Economic Functions

Payment systems enable:

- Value transfer between parties
- Settlement of obligations
- Support for economic transactions

Key Economic Properties

- Network goods (value ↑ with users)
- Infrastructure characteristics
- Significant fixed costs

System Types

Large Value (Wholesale)

- Fedwire, TARGET2
- RTGS: Real-time gross settlement
- Low volume, high value

Retail

- Cards, ACH, instant payments
- High volume, lower value
- Consumer-facing

Payment systems exhibit natural monopoly characteristics due to network effects

Network Effects in Payments

Direct Network Effects
Value increases with users:

$$V(n) = n \cdot v(n)$$

where $v(n)$ is per-user value.

Metcalfe's Law (simplified)

$$V \propto n^2$$

- Each user can transact with $n - 1$ others
- Creates positive feedback loops

Implications for Payments

Adoption Dynamics

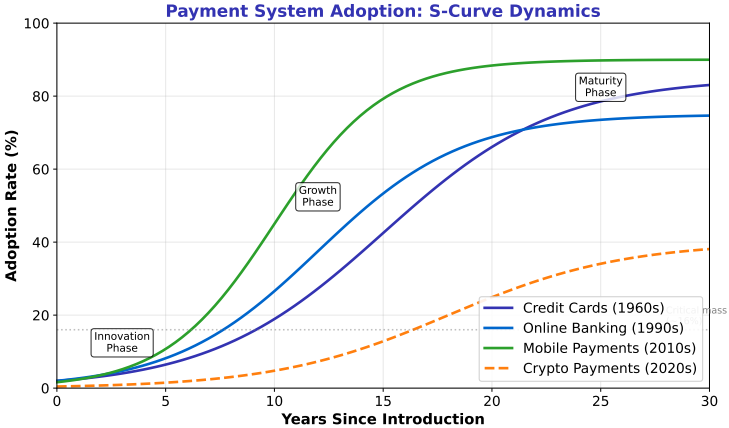
- Critical mass threshold
- Tipping points
- Winner-take-most markets

Entry Barriers

- Incumbents have user base advantage
- New entrants need to "buy" network
- Interoperability can reduce barriers

Network effects explain why few payment networks dominate each market segment

Payment Technology Adoption Patterns



S-curve adoption: slow start, rapid growth after critical mass (~16%), then saturation

Two-Sided Market Theory

The Platform Model
Card networks connect:

- Side 1: Cardholders (consumers)
- Side 2: Merchants (acceptors)
- Platform: Visa, Mastercard

Cross-Side Network Effects

- More merchants $\rightarrow$ more cardholders
- More cardholders $\rightarrow$ more merchants
- Chicken-and-egg problem

Rochet-Tirole Model
Optimal pricing:

$$p_B + p_S = c + m$$

$$\frac{p_B - c_B}{p_S - c_S} = \frac{\eta_S}{\eta_B}$$

where η = price elasticity

Key Insight
Price structure matters, not just level:

- Subsidize price-sensitive side
- Charge price-insensitive side
- "Get both sides on board"

Rochet & Tirole (2006): Two-sided markets require analysis beyond standard economics

Interchange Fee Economics

The Fee Flow

1. Consumer pays $100
2. Merchant receives $97-98
3. Interchange: 1.5-2% to issuer
4. Network fee: 0.1-0.2%
5. Acquirer margin: 0.2-0.5%

Economic Rationale

- Issuer bears fraud risk
- Subsidizes cardholder rewards
- Balances two-sided market

Regulatory Debate

Against High Interchange

- Merchants pass costs to prices
- Regressive: cash users subsidize card users
- Anti-competitive coordination

For Market Rates

- Funds card benefits
- Network competition exists
- Caps reduce innovation

EU capped interchange at 0.2-0.3%; US Durbin Amendment capped debit at 0.05%+21c

Cross-Border Payment Challenges

The Problem

Cross-border payments are:

- Expensive: 6%+ average cost
- Slow: 2-5 days settlement
- Opaque: uncertain fees
- Fragmented: many intermediaries

Root Causes

- Lack of common infrastructure
- Regulatory fragmentation
- Legacy technology
- Correspondent banking model

Economic Inefficiencies

FX Costs

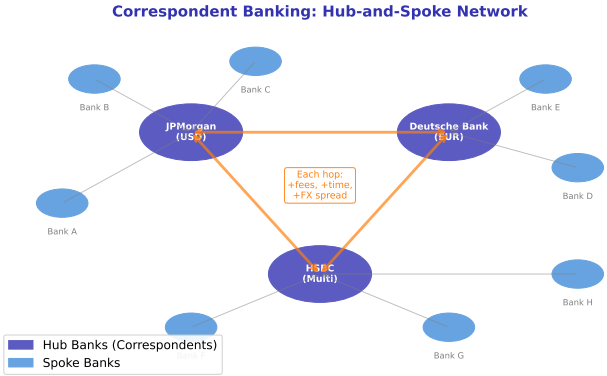
- Wide bid-ask spreads
- Hidden markups in rates
- Multiple conversions

Compliance Costs

- AML/KYC at each hop
- Sanctions screening
- Data format inconsistencies

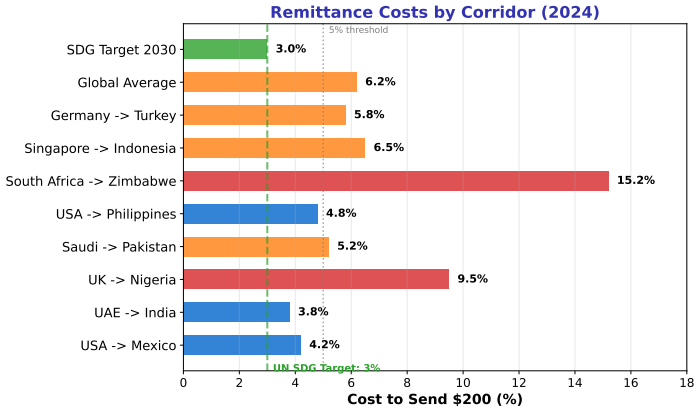
G20 target: reduce average cost to 3% by 2027; currently at 6%+

Correspondent Banking Network



Hub-and-spoke model adds costs and delays; each intermediary takes fees

Remittance Costs: The Scale of Inefficiency



High-cost corridors (Africa) hurt poorest populations most; digital can reduce costs

Settlement System Design

RTGS (Real-Time Gross)
Characteristics:

- Immediate, final settlement
- Each transaction settled individually
- High liquidity requirement

Examples: Fedwire, TARGET2

Trade-offs:

+ Eliminates settlement risk
- High liquidity cost

DNS (Deferred Net)
Characteristics:

- Batch settlement at intervals
- Payments netted against each other
- Lower liquidity needs

Examples: ACH, many retail systems

Trade-offs:

+ Liquidity efficient
- Settlement risk until batch

Hybrid systems combine benefits: queue management, partial netting with RTGS

Instant Payments: Economic Impact

Global Rollout

Major systems:

- UK: Faster Payments (2008)
- India: UPI (2016)
- EU: SEPA Instant (2017)
- US: FedNow (2023)

Design Features

- 24/7/365 availability
- Settlement in seconds
- Irrevocable payments

Economic Benefits

For consumers:

- Improved cash flow management
- Emergency transfers
- P2P payments

For businesses:

- Working capital optimization
- Reduced float costs
- Real-time reconciliation

For economy:

- Velocity of money increase
- Reduced payment friction

India's UPI: 10+ billion transactions/month; transformed payment landscape

Financial Inclusion Economics

The Unbanked

1.4 billion adults lack accounts:

- Documentation barriers
- Physical access (branches)
- Minimum balance requirements
- Trust and literacy issues

Economic Costs

- Check cashing fees (2-5%)
- No savings accumulation
- Excluded from credit

Mobile Money Success

M-Pesa (Kenya) model:

- Agent network (not branches)
- Phone-based (no smartphone needed)
- Low-value, low-cost transactions

Impact Evidence

- Suri & Jack (2016): 2% poverty reduction
- Women especially benefited
- Improved risk sharing

Mobile money shows technology can reduce barriers; requires complementary ecosystem

Digital Solutions to Payment Inefficiencies

Blockchain-Based

- Ripple/XRP for cross-border
- Stablecoins for remittances
- DeFi payment rails

Advantages:

- Bypass correspondent banking
- 24/7 operation
- Lower intermediary costs

Traditional Innovation

- SWIFT gpi improvements
- ISO 20022 messaging standard
- Linked instant payment systems

Comparison

- Blockchain: disruptive but immature
- Traditional: incremental but reliable
- Likely hybrid outcome

Competition between approaches benefits users; both have role to play

Competition and Regulation in Payments

Market Structure Issues

- Natural monopoly tendencies
- High barriers to entry
- Winner-take-most dynamics

Regulatory Responses

- Interchange caps (EU, US)
- Open banking mandates
- Access to payment systems

Big Tech Entry

- Apple Pay, Google Pay
- Alipay, WeChat Pay
- Meta (stablecoin attempt)

Policy Concerns

- Data concentration
- Systemic risk
- Competitive fairness

Regulators balance innovation promotion against financial stability and competition

Key Takeaways

Main Conclusions

1. Payment systems are network goods
2. Two-sided markets require special analysis
3. Cross-border payments remain inefficient
4. Digital innovation offers solutions

Economic Framework

- Network effects and critical mass
- Two-sided market pricing
- Correspondent banking costs
- Financial inclusion economics

Core Insight

Payment system economics explains both why incumbents dominate and why digital disruption is difficult but potentially transformative.

Next lesson: Platform Economics and Token Economics

Further Reading

Academic Papers

- Rochet & Tirole (2006): "Two-Sided Markets"
- Suri & Jack (2016): "The Long-Run Poverty Effects of M-Pesa"
- Kahn & Roberds (2009): "Payment System Settlement"

Policy Reports

- BIS (2020): "Enhancing Cross-border Payments"
- FSB (2020): "Cross-border Payments Roadmap"
- World Bank Remittance Reports

All readings available on course platform