Exercises: Lesson 1.2 – The Economics of Financial Intermediation

Module 1: The Cost Problem

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Exercise 1: Interchange Fee Calculation

A card network sets the following interchange schedule for consumer debit cards:

Transaction Type	Interchange Rate
In-store (chip & PIN)	0.20% + €0.05
Online (card-not-present)	0.25% + €0.08
Contactless (below €25)	0.15% + €0.03

Tasks:

a. Calculate the interchange fee for a €120 in-store chip & PIN purchase.

b. Calculate the interchange fee for a €45 online purchase.

c. Calculate the interchange fee for a €18 contactless purchase.

d. A merchant processes 10,000 in-store transactions per month with an average value of €55. What is the total monthly interchange cost?

e. If the EU IFR caps debit interchange at 0.20%, recalculate part (b). What is the merchant's monthly saving if 3,000 of the 10,000 transactions in part (d) were online?

Exercise 2: Remittance Cost Analysis

A migrant worker sends \$300 home each month using Provider X with the following fee structure:

- Flat transfer fee: \$5.99
- FX markup: 2.5% above the mid-market rate
- Mid-market rate: 1 USD = 82.50 local currency units (LCU)
- Provider's offered rate: 1 USD = 80.44 LCU

Tasks:

a. Verify that the offered rate reflects a 2.5% markup over the mid-market rate.

b. Calculate the amount received in LCU after the flat fee is deducted.

c. What is the total cost as a percentage of the \$300 sent?

d. Provider Y charges no flat fee but offers 1 USD = 78.00 LCU. Which provider is cheaper, and by how much in LCU?

e. If the worker switches to a digital-only provider charging \$1.99 flat fee and 0.5% FX markup, what are the annual savings in USD compared to Provider X? (12 monthly transfers.)

Exercise 3: Correspondent Banking Chain

A company in Country A sends $50,000 to a supplier in Country B. The payment passes through the following chain:

Node	Fee (bps)	Processing Time
Sender's Bank	10	0.5 days
Correspondent Bank 1 (USD hub)	15	1.0 days
Correspondent Bank 2 (local hub)	12	1.0 days
Receiver's Bank	8	0.5 days
FX conversion (at Corr Bank 2)	45 bps spread	(included above)

Tasks:

a. Calculate the total fee in dollars (excluding FX).

b. Calculate the FX spread cost in dollars.

c. What is the total cost as a percentage of the $50,000 payment?

d. What is the total end-to-end settlement time?

e. If the sender could bypass both correspondent banks using a direct connection (fee: 20 bps, FX: 25 bps, time: 0.5 days), calculate the savings in dollars and days.

Exercise 4: Two-Sided Market Pricing

A payment platform serves consumers (Side A) and merchants (Side B). The platform charges:

- Consumer fee per transaction: \$0 (subsidized)
- Merchant fee per transaction: 2.0% of transaction value
- Average transaction value: \$40
- The platform currently has 500,000 consumers and 20,000 merchants
- Each consumer makes 8 transactions per month

Tasks:

a. Calculate the platform's monthly Gross Transaction Volume (GTV).

b. Calculate the platform's monthly revenue from merchant fees.

c. If the platform introduces a \$0.10 per-transaction fee on consumers, estimate how many consumers leave (assume 15% churn). What is the new monthly revenue?

d. Using Metcalfe's Law (network value $\propto n^2$), by what factor does the network's theoretical value decrease after the consumer churn in part (c)?

e. Argue whether the consumer fee is a net positive or negative decision for the platform. Consider both revenue and network effects.

Exercise 5: Waterbed Effect Modeling

Before interchange regulation, a bank earns the following annual revenue per cardholder:

Revenue Source	Annual Amount
Interchange income	\$85
Annual card fee	\$0 (no fee)
Interest income (revolvers)	\$120
Late / overdraft fees	\$35
Total	**\$240**

After regulation, interchange income drops by 60%.

Tasks:

a. Calculate the new interchange income per cardholder.

b. What is the revenue shortfall compared to the pre-regulation total?

c. The bank introduces a \$25 annual card fee and increases late fees by 20%. Does this fully offset the shortfall? Show the new total.

d. If 12% of cardholders close their accounts due to the new annual fee (and those cardholders had average total revenue of \$240), what is the net revenue impact on a portfolio of 2 million cardholders?

e. Discuss whether consumers as a whole are better or worse off after the regulation, considering both lower merchant fees and higher direct fees.

Exercise 6: Nostro Account Liquidity Cost

A mid-sized bank maintains nostro accounts in 8 currencies. The table below shows the average balance and the bank's cost of capital:

Currency	Avg. Balance (USD equiv.)	Cost of Capital
USD	$5,000,000	5.0%
EUR	$4,000,000	4.5%
GBP	$3,000,000	5.2%
JPY	$2,500,000	1.5%
CHF	$1,500,000	2.0%
AUD	$1,000,000	5.5%
SGD	$800,000	4.0%
HKD	$700,000	5.0%

Tasks:

a) Calculate the annual liquidity cost for each currency and the total.

b) If the bank processes 120,000 cross-border payments per year, what is the average liquidity cost per payment?

c) A liquidity optimization service promises to reduce average balances by 35% for a fee of $250,000 per year. Is this worthwhile? Calculate the net saving.

Exercise 7: TCE Framework Application

Apply Williamson's three dimensions (asset specificity, uncertainty, frequency) to the following financial services. Rate each dimension as Low, Medium, or High, and predict the governance outcome (Market, Hybrid, or Hierarchy).

Service	Asset Spec.	Uncertain.	Frequency	Governance
Retail point-of-sale payment				
Syndicated corporate loan				
Peer-to-peer mobile transfer				
High-frequency trading				
One-time real estate escrow				

Tasks:

a) Fill in the table with your ratings and predicted governance.

b) For each row, write one sentence justifying your asset specificity rating.

c) Identify which service is most amenable to disintermediation by a FinTech, and explain why using TCE logic.

Exercise 8: Regulatory Comparison

Compare the EU Interchange Fee Regulation (IFR) and the US Durbin Amendment using the framework below:

Dimension	EU IFR	US Durbin
Scope (card types)		
Cap levels		
Exemptions		
Affected institutions		
Primary beneficiary		

Tasks:

a. Fill in the comparison table from the lesson content.

b. A small European merchant processes €500,000 in annual card sales (70% debit, 30% credit). Calculate total interchange before and after IFR, assuming pre-IFR rates of 0.75% (debit) and 1.80% (credit).

c. A US retailer processes $800,000 in annual debit card sales at large-issuer banks. Calculate annual interchange savings under Durbin, assuming pre-Durbin rate of 0.75% and post-Durbin rate of approximately 0.22%.

d. Which regulatory approach better achieves the goal of lowering consumer prices? Justify your answer in 3–4 sentences.