Lesson 2.1 Exercises: Financial Exclusion

Module 2: The Access Problem

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Digital Finance — BSc Course

Exercise 1: Classifying Exclusion Barriers

Scenario: For each of the following situations, classify the barrier as **supply-side**, **demand-side**, or **structural**, and explain your reasoning in one sentence.

a. A bank closes all branches in a rural district because they are unprofitable.
b. A subsistence farmer cannot read the loan contract written in the official national language (not her local dialect).
c. A mobile money provider requires a national ID, but the government's ID office has a 6-month backlog.
d. A woman in a conservative community is not permitted by her family to visit a bank staffed by male employees.
e. A digital lender's algorithm systematically rejects applicants from a specific postal code.

Difficulty: Introductory — tests understanding of the exclusion taxonomy.

Exercise 2: The Adverse Selection Spiral

Scenario: A microfinance lender enters a new market with 1,000 potential borrowers. The lender has no credit data. The true (unknown) distribution is:

- 700 low-risk borrowers (5% default probability, willing to borrow at up to 20% APR)
- 300 high-risk borrowers (40% default probability, willing to borrow at any rate)

The lender sets a single interest rate to cover expected losses. Average loan: \$500. Cost of funds: 8%.

Tasks:

a) Calculate the **blended default rate** if all 1,000 borrowers take loans.

b) What interest rate must the lender charge to break even at this blended default rate? (Hint: Revenue needed = principal $\times$ default rate + cost of funds.)

c) At this break-even rate, how many low-risk borrowers will accept? (Use the 20% APR ceiling.)

d) Recalculate the blended default rate with the remaining pool. What happens?

Difficulty: Intermediate — demonstrates the adverse selection death spiral quantitatively.

Exercise 3: Agent Banking Economics

Scenario: A mobile money provider considers deploying agents in a rural district. Key parameters:

Parameter	Value
Population of district	50,000
Expected adoption rate (Year 1)	15%
Average transactions per user per month	8
Average transaction value	$12
Agent commission rate	0.6% of transaction value
Agent monthly operating cost	$80
Number of agents planned	25

Tasks:

a. Calculate the total number of monthly transactions in the district.

b. Calculate the average monthly commission income **per agent** (assume transactions are evenly distributed).

c. Is the agent business viable in Year 1? (Compare commission income to operating cost.)

d. At what adoption rate does the average agent break even?

Difficulty: Intermediate — requires multi-step business viability calculation.

Exercise 4: Designing a Tiered KYC Framework

Scenario: You are advising a regulator in a developing country where 40% of adults lack government-issued ID. The country wants to launch a national mobile money platform.

Tasks:

a) Design a **three-tier KYC framework**. For each tier, specify: (1) required identity documents, (2) maximum account balance, (3) maximum daily transaction limit, and (4) available services.

b) Explain why the balance and transaction limits should increase with each tier.

c) A criminal attempts to use 100 Tier 1 accounts (each with a $100 daily limit) to launder $10,000 per day. What **automated monitoring mechanism** could detect this pattern?

d) A customer wants to upgrade from Tier 1 to Tier 2 but lives 50 km from the nearest government ID office. Propose a **digital alternative** for identity verification.

Difficulty: Advanced — requires regulatory design thinking and risk analysis.

Exercise 5: Why Can't We Just Copy M-Pesa?

Scenario: A government in Southeast Asia wants to replicate Kenya's M-Pesa success. The country has:

- 4 mobile operators, each with 15–30% market share (none dominant)
- 55% bank account penetration (moderate, not low)
- Strong banking lobby that opposes MNO-led financial services
- 70% smartphone penetration (high)

Tasks:

a) Identify **three specific factors** from Kenya's success that are absent in this country.

b) For each absent factor, explain why it matters for mobile money adoption.

c) Would an MNO-led model or a bank-led model be more appropriate here? Justify your answer.

d) Propose a **hybrid model** that could work in this market. Describe the roles of banks, MNOs, and the regulator.

Difficulty: Advanced — requires comparative analysis and creative policy design.

Exercise 6: Closing the Gender Gap

Scenario: In a Sub-Saharan African country, 60% of men have mobile money accounts but only 35% of women. Research identifies three primary barriers for women:

1. 40% of women do not own a personal phone (they share a household phone)
2. 50% of women lack government-issued ID in their own name
3. Women report that male-staffed agents make them uncomfortable

Tasks:

a) For each barrier, propose one **specific product or policy intervention** that addresses it.

b) Rank your three interventions by expected impact-per-dollar. Explain your ranking.

c) A mobile money provider argues: "We treat all customers equally — gender-specific programs are discriminatory." Write a 3–4 sentence rebuttal using the concept of *equitable* vs. *equal* access.

Difficulty: Advanced — requires policy analysis and structured argumentation.

Exercise 7: Digital Identity — Access vs. Privacy

Scenario: A government proposes a centralized biometric digital identity system (like India's Aadhaar) that would:

- Provide every citizen with a unique 12-digit number linked to fingerprints and iris scans
- Enable instant e-KYC for bank accounts, mobile money, and government payments
- Store all identity data in a single government database
- Be mandatory for receiving government subsidies

Tasks:

a) List **three benefits** of this system for financial inclusion.

b) List **three risks** related to privacy, security, and civil liberties.

c) India's Aadhaar database suffered a breach exposing data of 1.1 billion people. How does this event change your cost-benefit analysis?

d) Propose a **decentralized alternative** that preserves the inclusion benefits while mitigating the privacy risks. Describe how it would work in 4–5 sentences.

Difficulty: Advanced–Evaluative — requires balancing competing values.

Exercise 8: Comprehensive Case — Designing Inclusion for Country X

Scenario: Country X has the following characteristics:

- Population: 30 million; 60% rural
- Bank account penetration: 22% of adults
- Mobile phone penetration: 75% (mostly feature phones)
- Government ID coverage: 55% of adults
- One dominant MNO with 65% market share
- GDP per capita: $1,200/year
- No existing regulatory sandbox

Tasks:

a. Estimate the number of unbanked adults. Of these, how many have mobile phones?

b. Design a **3-year inclusion strategy** with three phases: (1) quick wins, (2) infrastructure, (3) ecosystem. For each phase, name the primary intervention.

c. Calculate: if the MNO charges 1% per transaction, average 5 transactions/user/month at $8 average, what is the MNO's annual revenue from 3 million users?

d. The banking lobby argues that MNOs should not be allowed to offer financial services. Write a **one-paragraph policy brief** to the finance minister, arguing for a hybrid regulatory approach.

Difficulty: Advanced–Integrative — combines all lesson concepts into a country-level strategy.

Answer Key

Exercise 1:

(a) **Supply-side:** Bank's cost-benefit decision to close unprofitable branches.

(b) **Demand-side:** Literacy/language barrier prevents the customer from engaging.

(c) **Structural:** Government ID infrastructure bottleneck blocks access regardless of willingness.

(d) **Demand-side:** Social norms and gendered access restrictions.

(e) **Supply-side:** Algorithmic discrimination in the provider's lending model (could also be structural if the data reflects systemic bias).

Exercise 2:

(a) Blended default rate $= (700 \times 0.05 + 300 \times 0.40)/1{,}000 = (35 + 120)/1{,}000 = 15.5\%$.

(b) Break-even rate = default rate + cost of funds $= 15.5\% + 8\% =$ **23.5% APR**.

(c) At 23.5%, low-risk borrowers (ceiling 20%) refuse. Only 300 high-risk borrowers remain.

(d) New blended default $= 40\%$. New break-even $= 48\%$. Death spiral: rate rises, quality falls further. This is the adverse selection trap.

Answer Key (continued)

Exercise 3:

(a) Users = 50,000 × 15% = 7,500. Monthly transactions = 7,500 × 8 = **60,000**.

(b) Per agent: 60,000 / 25 = 2,400 transactions. Commission = 2,400 × $12 × 0.6% = 2,400 × $0.072 = **$172.80/month**.

(c) $172.80 > $80 operating cost. **Yes, viable.** Net profit per agent: $92.80/month.

(d) Break-even: need commission ≥ $80. Per agent needs 80/0.072 = 1,111 transactions → total 27,778 → 27,778 / 8 = 3,472 users → adoption = 3,472 / 50,000 = **6.9%**.

Exercise 5:

(a) Absent factors: (1) No dominant MNO for network effects, (2) Moderate bank penetration reduces urgency, (3) Banking lobby blocks MNO-led model.

(c) Bank-led or hybrid model is more appropriate: existing bank infrastructure, fragmented MNO market, smartphone penetration enables bank apps (not just USSD).

Exercise 8:

(a) Unbanked adults: assume 20M adults × (1 − 0.22) = **15.6M unbanked**. With phones: 15.6M × 75% = **11.7M**.

(c) Revenue = 3M × 5 × $8 × 1% × 12 = 3M × $0.40 × 12 = 3M × $4.80 = **$14.4M/year**.

Answer Key (continued)

Exercise 4:

(a) Example framework: **Tier 1:** Phone number only; $100 balance; $50/day; P2P transfer + bill pay. **Tier 2:** National ID or biometric; $1,000 balance; $300/day; + savings, micro-credit. **Tier 3:** Full ID + proof of address; unlimited; + loans, insurance, international transfer.

(b) Higher limits = higher potential for misuse. Increasing limits with verification ensures that risk exposure is proportionate to the regulator's confidence in the customer's identity.

(c) Velocity monitoring: flag accounts that transact at or near the daily limit every day, especially if linked to the same device, SIM batch, or geolocation. Network analysis: detect clusters of accounts with correlated transaction patterns.

(d) Agent-assisted biometric enrollment: the mobile money agent captures fingerprint/photo using a smartphone, submits to a central database for deduplication, and issues a digital ID linked to the phone number. No travel to a government office required.

Exercise 6:

(a) Barrier 1: Subsidized SIM-only phones for women registrants. Barrier 2: Allow biometric registration without paper ID (fingerprint at agent). Barrier 3: Recruit and train female agents; designate "women-only" agent hours.

(b) Ranking: (2) biometric ID $>$ (3) female agents $>$ (1) phone subsidies. ID is the binding constraint; phones are cheaper but useless without ID; female agents improve comfort but do not solve the access gap alone.

(c) Equal treatment ignores unequal starting conditions. If women face barriers that men do not (no ID, no phone ownership, social restrictions), treating them identically perpetuates the gap. Equitable access means designing interventions that compensate for structural disadvantages, so that the outcome — actual access — is equal.