

Balance sheets, settlement systems and crossborder payments

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June 2024

FinTech and Cryptocurrencies - University of Cape Town

From the history of money to the art of making payments

- The history of money taught has that money has three functions: medium of exchange, unit of account, store of value
- Money is the medium by which things are exchanged, and not, the value for which they are
- Financial intermediaries facilitate payments and charge fees to do so
 - Numerous benefits: access, risk pooling, reducing information asymmetries
- The major focus of financial regulation today is ensuring banks hold enough, appropriate, high-quality capital
- Today: How are payments get made? What does the payment infrastructure look like? How are crossborder payments made?

Balance Sheets

What is financial reporting?

- “financial reporting provides financial information about the reporting entity that is useful to existing and potential investors, lenders, and other creditors in making decisions about providing resources to the entity.” - International Financial Reporting Standards (IFRS)
- All formally registered firms must prepare financial reports at the end of each year
 - These reports must typically be subject to an external audit
 - Punishments for lack of reporting include fines & a suspension of company license
- While not required by law, informal firms will also prepare basic financial reports
 - At the most basic level, all firms need to know if they've made a profit or loss
- The full set of financial reports offer a comprehensive and holistic view of the firm

Two main types of financial reports

Income Statement

Income

Expenses

Profit

Losses

Balance sheet

Assets

Liabilities

Equity

Net worth

Two main types of financial reports

Income Statement

Income

Expenses

Profit

Losses

Balance sheet

Assets

Liabilities

Equity

Net worth

- Two other components
 - Cash flow statement → insights into liquidity and solvency
 - Statement of Changes in Equity → reports on retained earnings, dividends and equity changes

Financial reporting is a necessity for all firms

- Bookkeeping involves the recording of a company's financial transactions on a regular basis
- Note the deliberate use of the term financial transactions
 - Transactions refer to the purchase and sale of goods and services
 - In addition to this, financial transactions include any transactions that result in change in the value of assets, liabilities, or equity in a business
- There are two main approaches to bookkeeping: single-entry and double-entry
 - We'll cover both approaches, although double-entry is commonplace

Single-entry bookkeeping

- TLDR: a method of bookkeeping that only involves keeping an income statement
- Income is recorded separately from expenses, which determines profit/loss

| IN | CASH | OUT |
|--------|----------|------------------|
| SALES | \$10,000 | EXPENSES \$8,000 |
| | | |
| PROFIT | \$2,000 | |

Single-entry bookkeeping is easily converted to income statement

INCOME STATEMENT

| | |
|----------|----------------|
| REVENUE | \$10,000 |
| EXPENSES | (\$8,000) |
| PROFIT | <u>\$2,000</u> |

The rise of double-entry bookkeeping

- Single-entry bookkeeping was the dominant form of accounting until late 15th century
- In fact, for many informal firms (or consultants) today, single-entry bookeeping is sufficient
- In the 14-15th century, the nature of firms start changing (assets, loans, equity)
- Single-entry bookkeeping is unable to meet the demands

Double-entry bookkeeping

- First evidence of double-entry bookkeeping is 1299-1300
- Formally codified in 1494 by Luca Pacioli, the “father of accounting”.
- While single-entry introduces us to the income statement, double-entry introduces us to the balance sheet

Balance sheets

- A balance sheet is a summary of the assets, liabilities and equity of a business at a particular point in time
- While the income statement shows profitability, a balance sheet shows net worth
- A balance sheet has 3 components

Assets

Real estate

Equipment

Patents / trademarks / IP

Liabilities

Debt

Loans

Equity

Investment

Earnings

Balance sheets

- Assets are *owned* by the bank
- Liabilities are *owed* by the bank
- Equity *owns* the bank
- **Key:** All balance sheets, must balance. How? The accounting equation

$$\text{Assets} = \text{Liabilities} + \text{Equity}$$

- Why? Everything the company owns (assets), been produced by people or funded by loans (liabilities), or must have been provided by owners (equity)

A bank's balance sheet

| Assets | Equity and Liabilities |
|---|---|
| <ul style="list-style-type: none">• Reserves• Cash• Securities/Bonds• Loans<ul style="list-style-type: none">• Company• Consumer• Real estate• Other• Other assets | <ul style="list-style-type: none">• Deposits• Debt<ul style="list-style-type: none">• Inter-bank loans• Central bank loans• Other• Shareholder equity |

How does double-entry bookkeeping work?

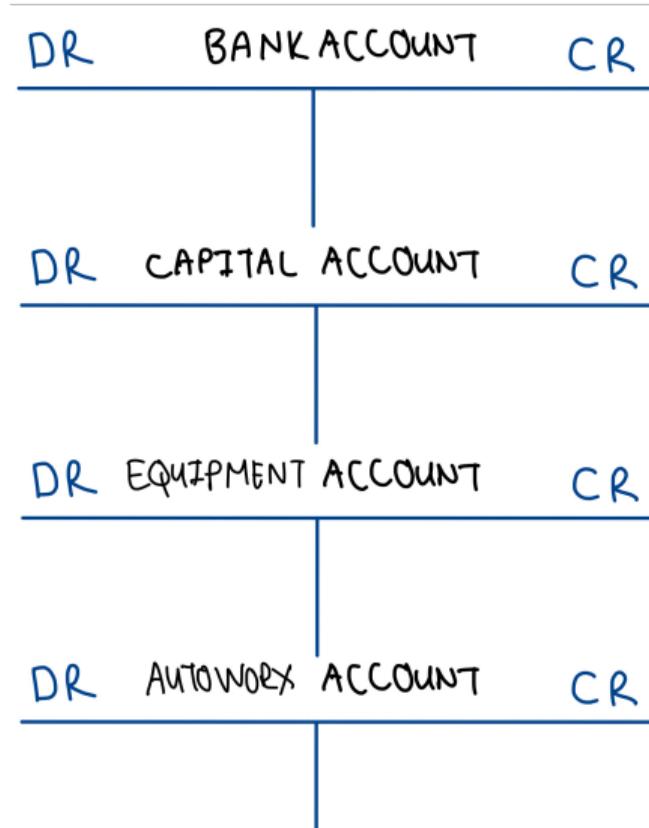
- Activities that relate to the balance sheet, are broken into separate accounts
- There are asset, liability and equity accounts
- At all times, the accounting equation must hold
- We replace the concept of “In” and “Out” with “Debit” and “Credit”

Double-entry rules

Debit the receiver, credit the giver

| Accounts | Action | Entry |
|-------------|----------|--------|
| Assets | Increase | Debit |
| | Decrease | Credit |
| Liabilities | Increase | Credit |
| | Decrease | Debit |
| Equity | Increase | Credit |
| | Decrease | Debit |

An example: Sarah starts a consulting company



An example: Sarah starts a consulting company

- She registers the company and invests \$50,000

| DR | BANK ACCOUNT | CR |
|----|-------------------|----|
| | | |
| DR | CAPITAL ACCOUNT | CR |
| | | |
| DR | EQUIPMENT ACCOUNT | CR |
| | | |
| DR | AUTOWORX ACCOUNT | CR |
| | | |

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An example: Sarah starts a consulting company

- She registers the company and invests \$50,000
- She buys a Macbook for \$2,000

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|---------|-------------------|----------|
| CAPITAL | \$50,000 | |
| DR | CAPITAL ACCOUNT | CR |
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| | Autoworx | ACCOUNT |
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| DR | CAPITAL ACCOUNT | CR |
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| BANK | \$2,000 | |
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| | | |

An example: Sarah starts a consulting company

- She registers the company and invests \$50,000
- She buys a Macbook for \$2,000
- She buys a car on credit for \$25,000

| DR | BANK ACCOUNT | CR |
|------|-------------------|-------------------|
| | CAPITAL \$50,000 | EQUIPMENT \$2,000 |
| DR | CAPITAL ACCOUNT | CR |
| | BANK \$50,000 | |
| DR | EQUIPMENT ACCOUNT | CR |
| BANK | \$2,000 | |
| DR | AUTOWORX ACCOUNT | CR |
| | | |

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| DR | CAPITAL ACCOUNT | CR |
| | BANK | \$50,000 |
| DR | EQUIPMENT ACCOUNT | CR |
| BANK | \$2,000 | AUTOWORX \$25,000 |
| DR | AUTOWORX ACCOUNT | CR |
| | | |

An example: Sarah starts a consulting company

- She registers the company and invests \$50,000
- She buys a Macbook for \$2,000
- She buys a car on credit for \$25,000
- Does the accounting equation hold?

| DR | BANK ACCOUNT | CR |
|----|------------------|-------------------|
| | CAPITAL \$50,000 | EQUIPMENT \$2,000 |

| DR | CAPITAL ACCOUNT | CR |
|----|-----------------|----|
| | BANK \$50,000 | |

| DR | EQUIPMENT ACCOUNT | CR |
|----|-----------------------------------|----|
| | BANK \$2,000 AUTOWORX \$25,000 | |

| DR | AUTOWORX ACCOUNT | CR |
|----|--------------------|----|
| | EQUIPMENT \$25,000 | |

An example: Sarah starts a consulting company

- She registers the company and invests \$50,000
- She buys a Macbook for \$2,000
- She buys a car on credit for \$25,000
- Does the accounting equation hold?
- Assets: $(\$50,000 - \$2,000) + (\$2,000 + \$25,000) = \$75,000$

| DR | BANK ACCOUNT | CR |
|---------|--------------|-------------------|
| CAPITAL | \$50,000 | EQUIPMENT \$2,000 |

| DR | CAPITAL ACCOUNT | CR |
|------|-----------------|----------|
| BANK | | \$50,000 |

| DR | EQUIPMENT ACCOUNT | CR |
|------|-------------------|-------------------|
| BANK | \$2,000 | AUTOWORX \$25,000 |

| DR | AUTOWORX ACCOUNT | CR |
|-----------|------------------|----------|
| EQUIPMENT | | \$25,000 |

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- She buys a car on credit for \$25,000
- Does the accounting equation hold?
- Assets: $(\$50,000 - \$2,000) + (\$2,000 + \$25,000) = \$75,000$
- Equity: \$50,000
- Liabilities: \$25,000

| DR | BANK ACCOUNT | CR |
|---------|--------------|-------------------|
| CAPITAL | \$50,000 | EQUIPMENT \$2,000 |

| DR | CAPITAL ACCOUNT | CR |
|------|-----------------|----------|
| BANK | | \$50,000 |

| DR | EQUIPMENT ACCOUNT | CR |
|------|-------------------|-------------------|
| BANK | \$2,000 | AUTOWORX \$25,000 |

| DR | AUTOWORX ACCOUNT | CR |
|-----------|------------------|----------|
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- Does the accounting equation hold?
- Assets: $(\$50,000 - \$2,000) + (\$2,000 + \$25,000) = \$75,000$
- Equity: \$50,000
- Liabilities: \$25,000
- Assets = Liabilities + Equity

| DR | BANK ACCOUNT | CR |
|---------|--------------|-------------------|
| CAPITAL | \$50,000 | EQUIPMENT \$2,000 |

| DR | CAPITAL ACCOUNT | CR |
|------|-----------------|----------|
| BANK | | \$50,000 |

| DR | EQUIPMENT ACCOUNT | CR |
|----------|-------------------|----|
| BANK | \$2,000 | |
| AUTOWORX | \$25,000 | |

| DR | AUTOWORX ACCOUNT | CR |
|-----------|------------------|----|
| EQUIPMENT | \$25,000 | |

Benefits to double-entry bookkeeping

- Systematic way to reconcile assets, equity and liabilities
- Accounting equation provides simple yet powerful rule
- When used in addition to the income statement (single-entry bookkeeping), provides for a holistic view of the company
- Not all companies need to use double-entry bookkeeping
 - The need to use double-entry bookkeeping is tied to the need to have a balance sheet
 - If your company has assets and equity, you need to use double-entry

Settlement systems

Money enables payments

- Yesterday we introduced the concepts of money and financial intermediaries
- We said that a key role of money is to facilitate transactions by making it easier to buy and sell goods
- Put differently, money enables payments
- Today we turn our attention to how payments work and how financial intermediaries facilitate these payments
- We'll cover a number of examples, each increasing in complexity.
 - Starting with a basic payment between two parties all the way through to cross-border payments

Payments

- Payments and payment systems are the plumbing of the economy
- For most of modern history, payments were boring and uninspiring
- This has changed in the last 50 or so years: debit cards, mobile payments, crypto, CBDCs
- Payments are big business
 - In 2022, \$8.7 trillion worth of digital payments made
 - In 2022, payment revenue accounted for 36% of total bank revenue

Payment system

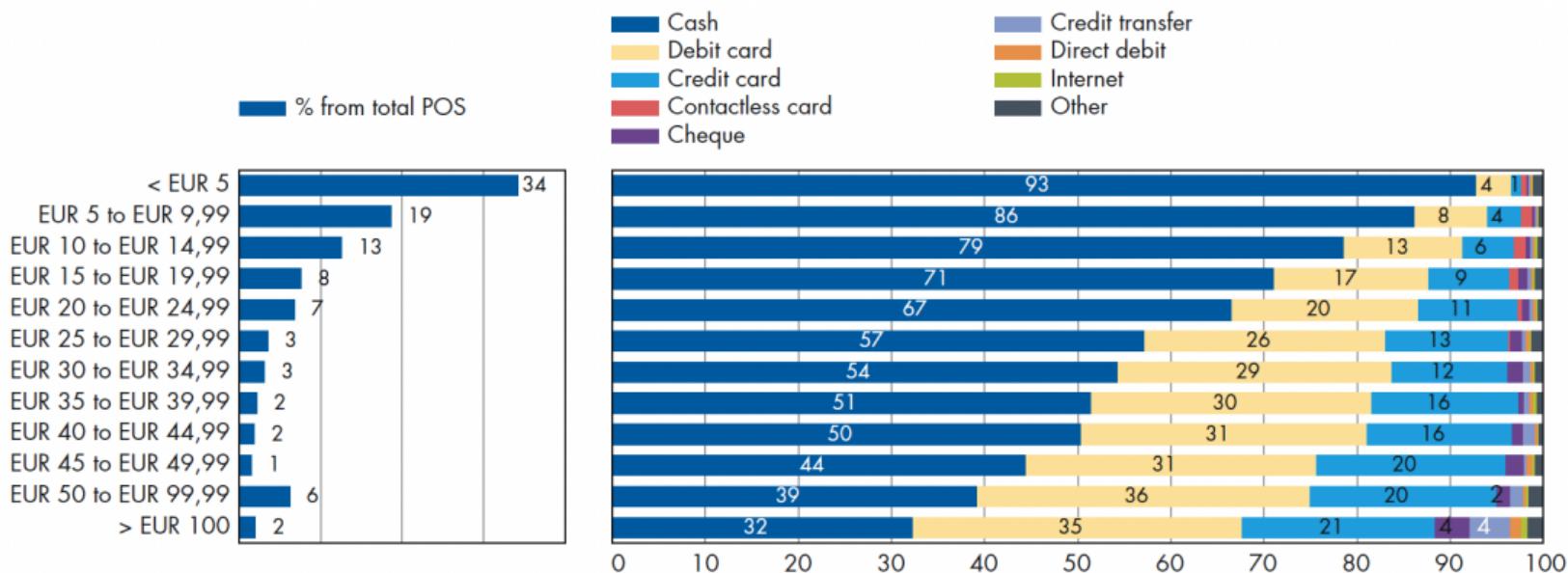
Changes in the payments ecosystem have ushered in four eras of payments business models.

Timeline



| | Paper Era: Pre-1960s | Plastic Era: 1960s–90s | Account Era: 1990s–2020s | Decoupled Era: 2020s |
|--|----------------------------------|--|---|---|
| Transactions | Cash, checks, and wire transfers | Cash, checks, wire transfers, and physical cards | Instant transfers, A2A, and virtual cards | Interoperable and open, platform, and decentralized |
| Sources of economic differentiation | Balances and deposits | Transaction fees | Relationships and transfer fees | Convenience, security, and low fraud incidence |
| Distribution channels | Physical (eg, branches) | Physical and ATMs | Physical, ATMs, online, mobile, and digital wallets | Physical, ATMs, online, mobile, embedded, and metaverse |
| Technology | Telegram | Automated Clearing House (ACH) | Applications and instant payments | Platform as a service (PaaS), tokenization, generative AI, and open/API banking |

How do people pay



The interbank funds transfer systems

- In the classic model of a financial system, banks facilitate payments
- We call the system banks use to transfer money, the **interbank funds transfer system**
- Two types of systems
 - (1) Wholesale funds transfer systems
 - Infrequent, low volume, large and time critical payments
 - Mainly financial market transactions
 - (2) Retail transfer systems
 - Frequent, large volume, small payments
 - POS transactions, EFTs, cheques etc.

Key concepts in interbank funds transfer systems

Transfer of information and processing

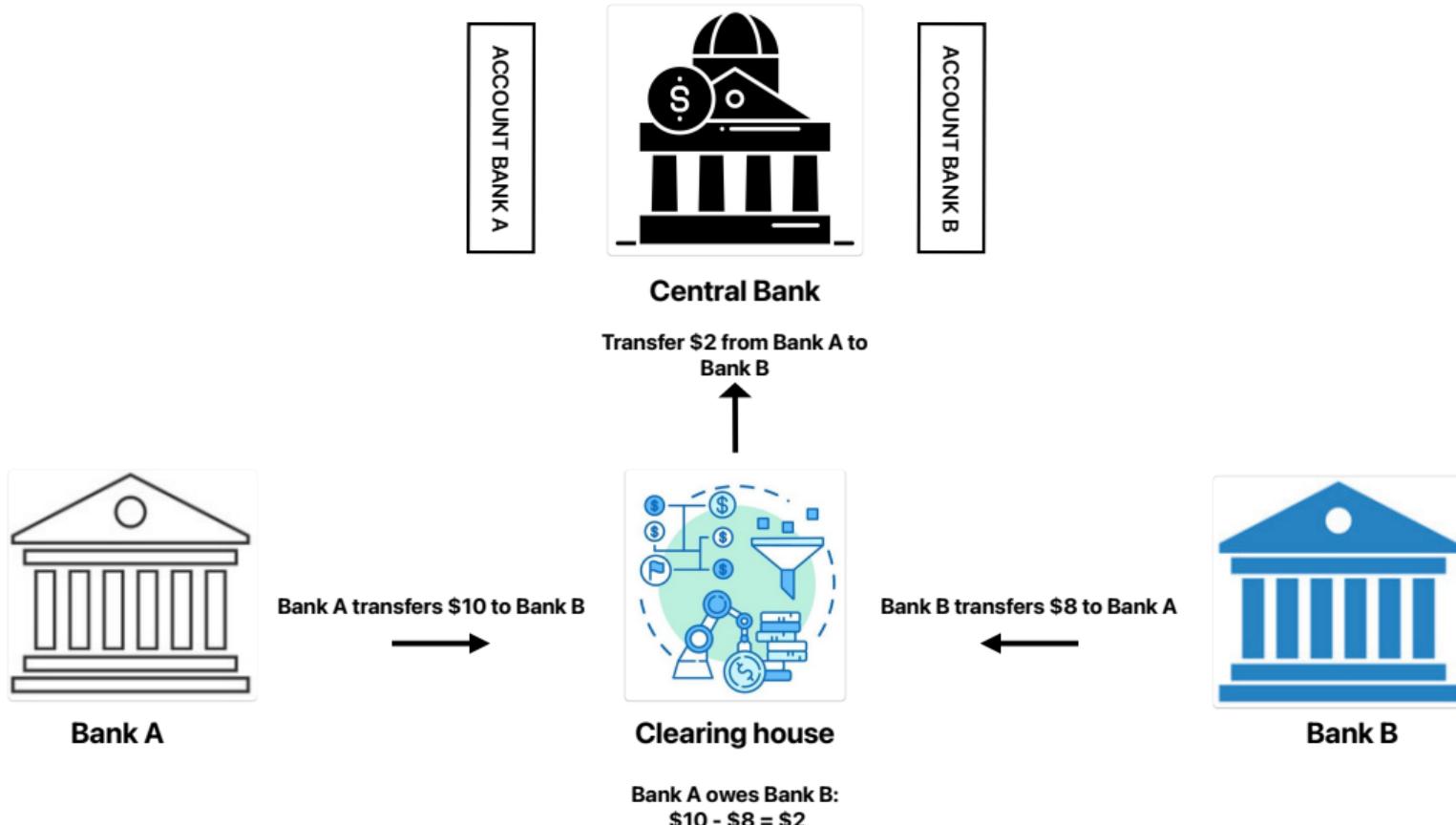
- A funds transfer is proceeded by a message, called a **payment order** requesting the transfer of funds to the payee
- These are typically credit transfers - both payment order and funds is sent from the bank of the payer to the bank of the payee
- However, they can also take the form of debit transfers (e.g debit orders)
- Once payment order is received, it is **processed** - identity, account and funds verification. Also referred to as **clearing**
- Once cleared, these payment orders represent a binding payment obligation

Key concepts in interbank funds transfer systems

Settlement

- Once a payment order has been received and cleared, settlement can take place
- Settlement discharges the obligation of the payer bank to the payee bank in respect of the transfer
- Once settlement is initiated, it is irrevocable and unconditional
- Settlement typically takes place in one of two places
 - A transfer across the books of a bank via a **clearing house** in the case of retail transfers
 - Cleared with commercial bank money
 - A transfer across the books of the **central bank** in the case of wholesale transfers
 - Cleared with central bank money

The mechanics of clearance and settlement



Settlement systems

- Interbank funds transfer systems can be classified in several ways
- Settlement systems differ in *when* and *how* they settle
 - When? At the end of each day (**designated-time/deferred**), or after each transaction (**continuous**)?
 - How? Settle net balance (**net**) or settle each transaction (**gross**)?

| Settlement characteristics | Gross | Net |
|----------------------------|-----------------------------------|--------------------------------------|
| Designated-time (deferred) | Designated-time gross settlement | Designated-time net settlement (DNS) |
| Continuous (real-time) | Real-time gross settlement (RTGS) | Not applicable |

- For many years, most banks utilized a **DNS** settlement system
- Today, **RTGS** settlement systems are commonplace

The mechanics of net settlement

- Consumer A transfers an amount, a , to Consumer B at 10:00
- Consumer B transfers an amount, b , to Consumer A at 11:30

| Consumer A | | | |
|----------------|-------|---------------------|-------|
| Account Bank A | X - a | Equity | X |
| Bank A | | | |
| Other assets | X | Deposits Consumer A | X - a |

| Consumer B | | | |
|----------------|-------|---------------------|-------|
| Account Bank B | X - b | Equity | X |
| Bank B | | | |
| Other assets | X | Deposits Consumer B | X - b |

- At the end of the day, the central bank clears

| Central Bank | | | |
|--------------|---|-----------------|-----------|
| Other assets | X | Deposits Bank A | X - a + b |
| | | Deposits Bank B | X + a + b |

- Net payments are settled

| Consumer A | | | |
|----------------|-----------|---------------------|-----------|
| Account Bank A | X - a + b | Equity | X |
| Bank A | | | |
| Other assets | X | Deposits Consumer A | X - a + b |

| Consumer B | | | |
|----------------|-----------|---------------------|-----------|
| Account Bank B | X - b + a | Equity | X |
| Bank B | | | |
| Other assets | X | Deposits Consumer B | X - b + a |

The advantages of net settlement

- Easier liquidity management
 - Netting of transactions requires smaller net payments and less capital/liquidity
- Reduces the number of transfers
- Delegating clearing and settlement allows for multilateral settlement
 - Transactions can be netted across multiple institutions resulting in fewer transfers
- Transaction can be reversed within a window of time
 - As settlement happens at a given time each day, transactions can be reverted before then

The disadvantages of net settlement

- Transactions take time to clear
- Complex clearing, especially for multilateral settlement
 - Scope for errors
- Silo record keeping
- Concentrates settlement risks
 - Settlement risk concentrated at a single point in the day
 - If issues arise, little time to address them

Gross settlement

- Consumer A transfers an amount, a , to Consumer B at 10:00
- Consumer B transfers an amount, b , to Consumer A at 11:30

| Consumer A | | | |
|----------------------------|-------|---------------------|-------|
| Account Bank A | X - a | Equity | X |
| Bank A | | | |
| Deposits with Central Bank | X - a | Deposits Consumer A | X - a |
| Other assets | X | | |
| Central Bank | | | |
| Other assets | X | Deposits Bank A | X - a |
| | | Deposits Bank B | X + a |
| Bank B | | | |
| Deposits with Central Bank | X + a | Deposits Consumer B | X + a |
| Other assets | X | | |
| Consumer B | | | |
| Account B | X + a | Equity | X |

| Consumer B | | | |
|----------------------------|-------|---------------------|-------|
| Account Bank B | X - b | Equity | X |
| Bank B | | | |
| Deposits with Central Bank | X - b | Deposits Consumer B | X - b |
| Other assets | X | | |
| Central Bank | | | |
| Other assets | X | Deposits Bank A | X + a |
| | | Deposits Bank B | X - a |
| Bank A | | | |
| Deposits with Central Bank | X + a | Deposits Consumer A | X + a |
| Other assets | X | | |
| Consumer A | | | |
| Account A | X + a | Equity | X |

The advantages of gross settlement

- Faster transactions
- Reduces settlement risk
 - Real-time settlement restricts settlement risk to the point of transactions
- Safety - transactions are no longer grouped together
 - Large grouped payments pose a greater cybersecurity risk

The disadvantages of gross settlement

- More transactions to process
- Amplifies operational or technical failures
 - Downtime or interruptions to the payment system can be destabilizing
- Introduces liquidity risk
 - Institutions need to have sufficient capital on hand to settle at any point

Cross-border settlement

Global transfers and settlement

"The holy grail of cross-border payments is a solution allowing cross-border payments to be

- immediate,
- cheap,
- universal, and
- settled in a secure settlement medium.

The search for such a solution is as old as international commerce and the implied need to pay... after more than thousand years of search, the holy grail of cross-border payments can be found within the next ten years" - European Central Bank (2022)

Challenges around global transfers

"Cross-border payments sit at the heart of international trade and economic activity. However, for too long cross-border payments have faced four particular challenges:

- high costs,
- low speed,
- limited access, and
- insufficient transparency.

Faster, cheaper, more transparent and inclusive cross-border payments would have widespread benefits for supporting economic growth, international trade, global development and financial inclusion. " - Financial Stability Board (2021)

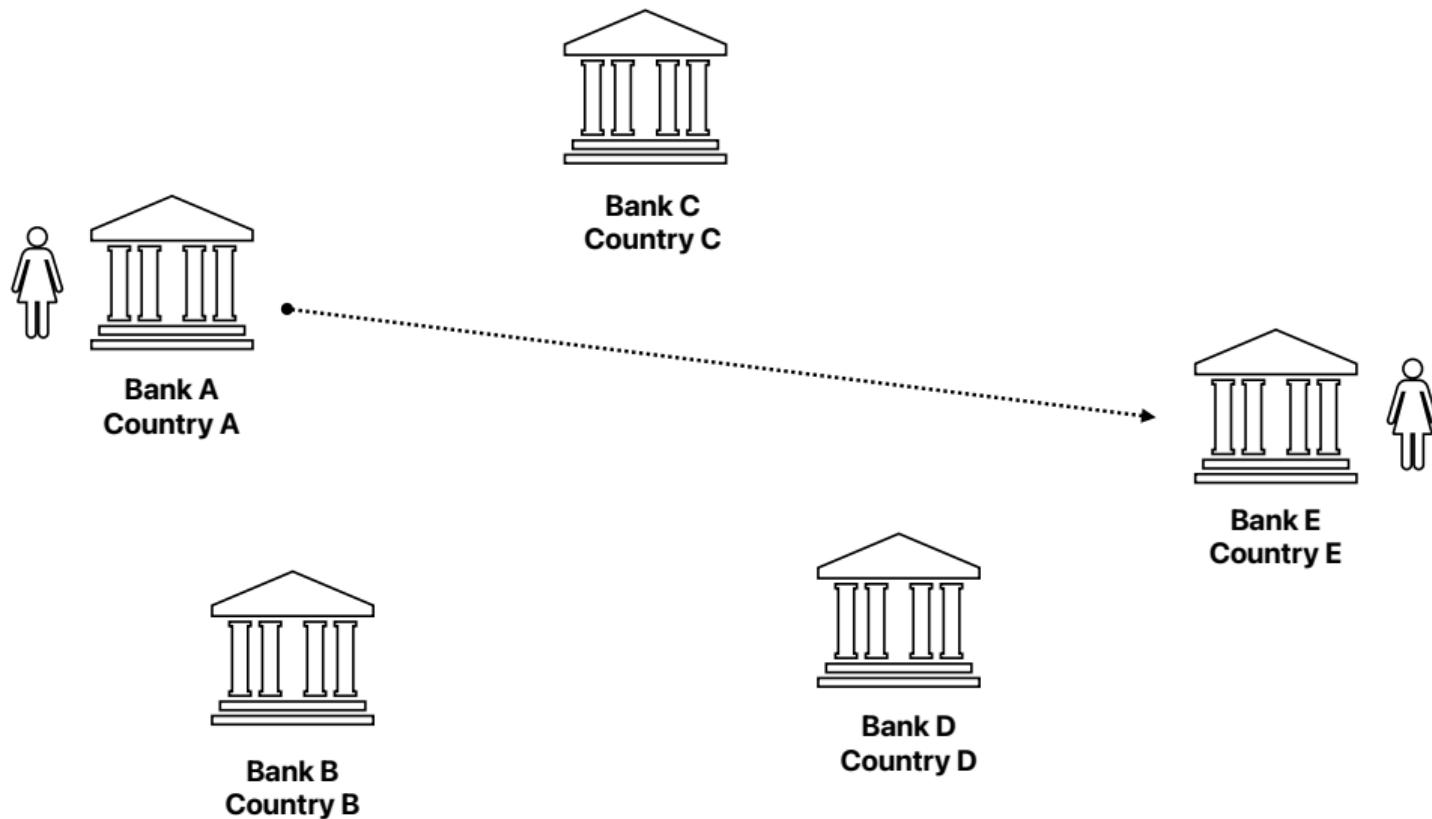
High costs and low speed. Why?

- Long transaction chains
- Currency conversion
- Time zone differences
- Exchange controls
- Anti-fraud and anti-money laundering

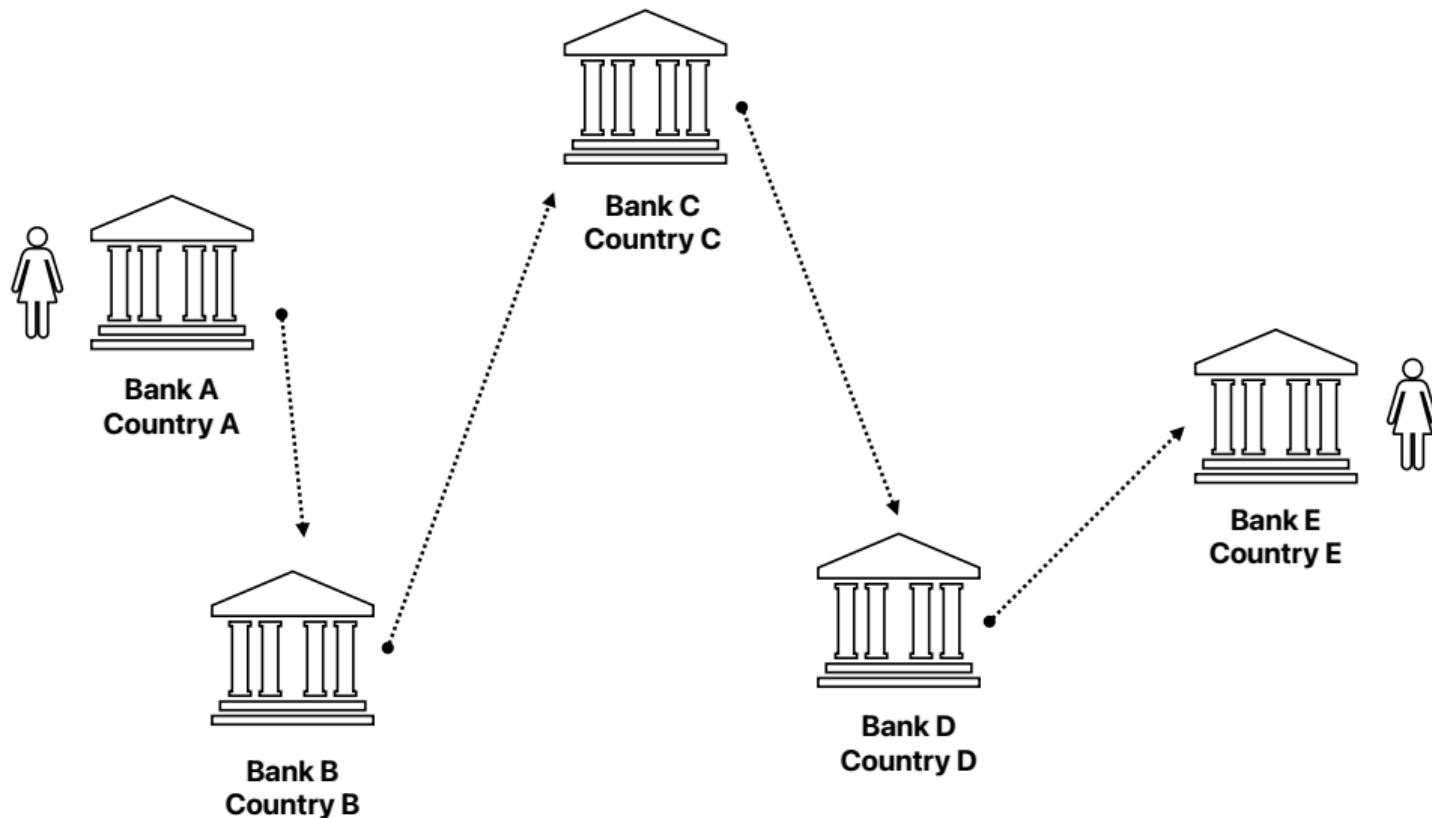
Long transaction chains

- Many settlement systems require a number of parties involved in order to enact a payment
- Cross border settlements have typically been enacted via *nostro* and *vostro* accounts
- *Nostro* account → a bank account that a domestic bank has with a foreign bank in foreign currency
 - Domestic banks money deposited at a foreign bank
- *Vostro* account → a bank account that a foreign bank holds for a foreign domestic bank in foreign currency
 - Domestic banks money held at a foreign bank
- For money to move from Country A to B, it must do so via *Nostro* accounts

Long transaction chains



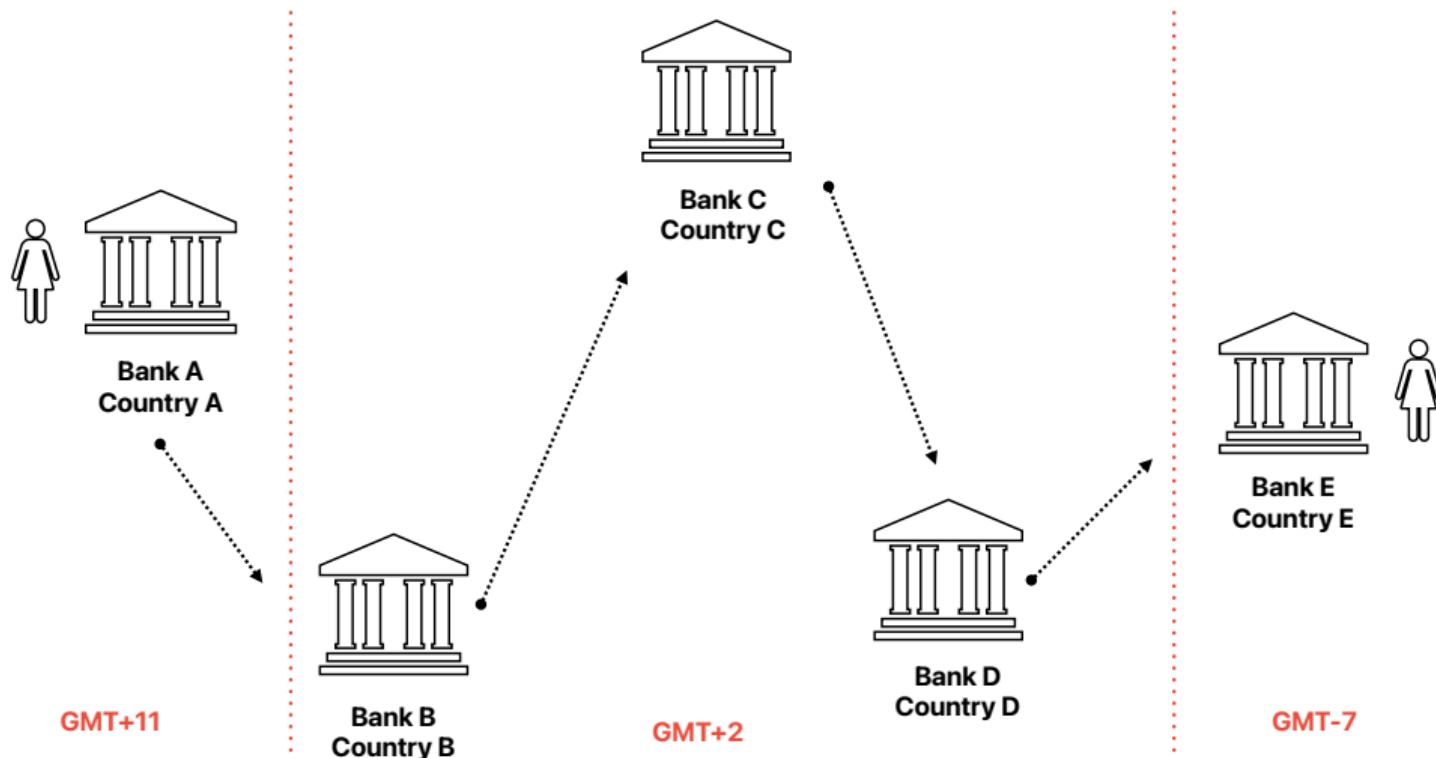
Long transaction chains



Time zone differences and currency risk

- Every example we considered so far, assumed Country A and Country B were in the same time zone
- However, imagine two countries (Japan and USA) where the overlap in bank operating hours is small (1-2 hours)
- This can significantly increase processing time
- This also influences *currency risk*
- Question of authority (who handles the currency conversion) and timing (when does the conversion occur)
- How is currency risk managed?

Long transaction chains



Exchange controls

- → government-imposed restrictions on the purchase and sale of currencies
- Imposed in many countries in the world, especially in emerging markets
- In such countries, all incoming and outgoing payments require the payer and payee to report the reason for the payment to their respective central bank
 - In SA, for example, Regulation 3(1) of the Exchange Control Regulations prohibits any person from transferring funds out of South Africa without the approval of the SARB
- This can lead to significant delays, especially for larger amounts

Anti-fraud and anti-money laundering

- Two features of cross-border payments that induce significant regulatory costs
- (1) AML/CFT → Anti-money laundering and countering the financing of terrorism
 - Financial Action Task Force (FATF) → international regulatory watchdog that oversees compliance with anti-money laundering rules
 - In the news recently: South Africa's greylisting
- (2) KYC → Know your customer requirements
 - Requirement for financial institutions to verify the identity of their customers and the legitimacy/legality of their payments and source of funds

Limited access and insufficient transparency. How and why?

- Countries with developed banking sectors are more likely to have extensive banking networks globally
 - In regions like Africa however, a lot of global banking goes via major countries (e.g. South Africa)
 - Large regulatory burden of AML/CFT/KYC makes global banking unprofitable in poorer countries
- Long processing times mean it is unclear when money will be transferred
- Currency risk means uncertainty as to the amount of money that will arrive in the payee's account
- High costs associated but no transparency about how/where those costs are borne

Searching for the holy grail of
cross-border settlement

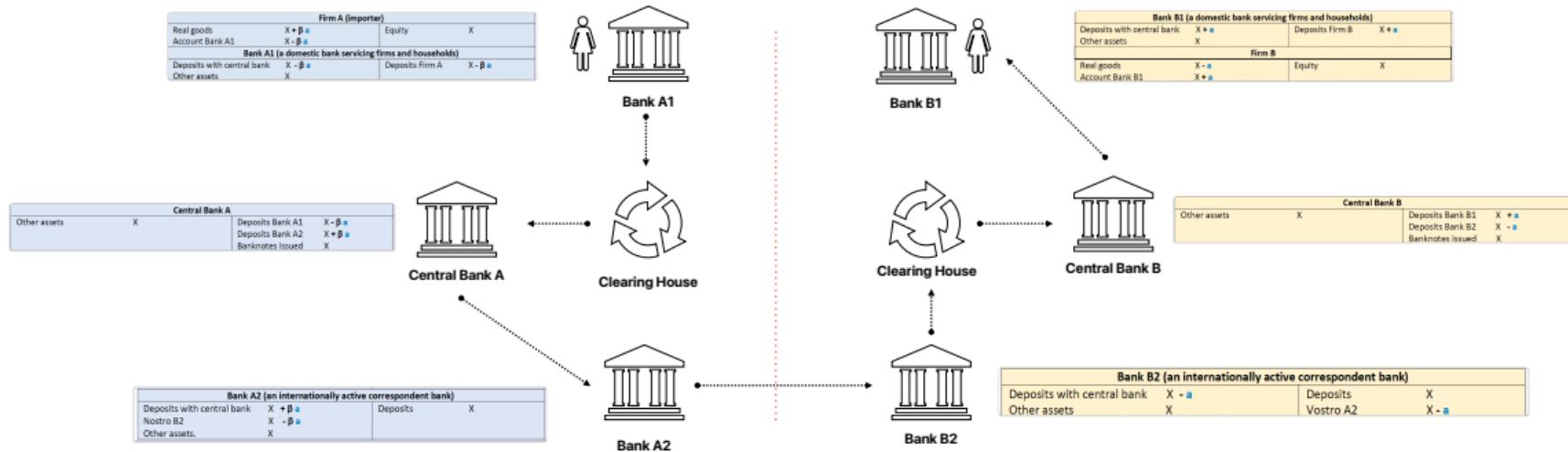
Towards the holy grail

- “after more than thousand years of search, the holy grail of cross-border payments can be found **within the next ten years**” - European Central Bank (2022)
- We'll look at 6 types of settlement systems that hold promise
 - Correspondant banking
 - Using a subsidiary FX bank
 - Regional RTGS
 - FinTech payment providers
 - Crypto, Stablecoins
 - CBDC

Correspondent banking

- The 'conventional' model
 - Transfer of funds via nostro accounts
 - Requires an internationally active correspondent bank
- Innovation of instant payments has made this process significantly faster and removed settlement risk

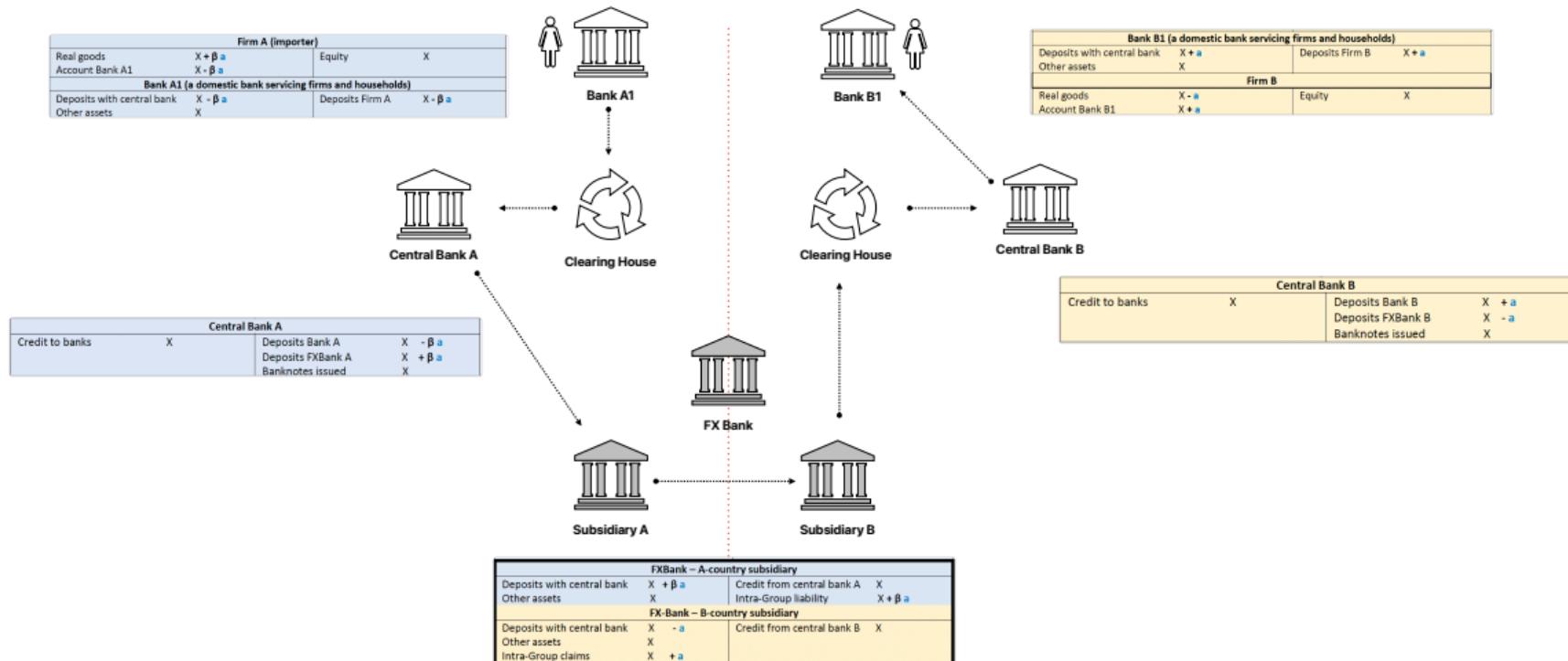
Correspondent banking



Pros and cons of correspondent banking

- Pros
 - Well-established (banking networks, kyc)
 - Diversifies the number of payment providers (increased competition)
 - Has universal reach
- Cons
 - Many intermediaries → slow and expensive
 - Transactions clear in commercial money and not, central bank money
 - When, and who to handle forex conversion?

Using a subsidiary FX bank



Pros and cons of subsidiary FX banks

- Pros
 - Well-established (banking networks, kyc)
 - Simpler than correspondent banking
 - Subsidiary bank handles forex conversion
- Cons
 - Requires multinational FX banks
 - Concentrates settlement risk in a small number of FX banks

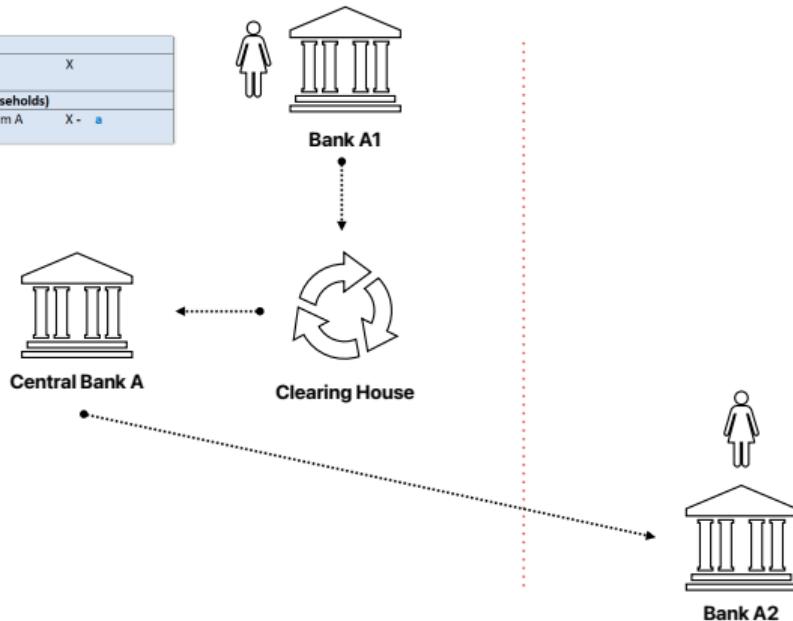
Regional RTGS

- In certain scenarios, customers may prefer to settle payments in currencies other than their own. Why?
 - Firms who conduct majority of their business in another country
 - Weak local currency
 - Dominant currency in a region (e.g South African Rand)
- This has led to the creation of Regional RTGS, managed by one central bank
 - E.g. SADC-RTGS
 - SARB manages clearing and settlement and allows banks in SADC to hold Rand accounts at the SARB

Regional RTGS

| Firm A (importer) | | |
|--|-------|-----------------------|
| Real goods | X + a | Equity X |
| Account Bank A1 | X - a | |
| Bank A1 (a domestic bank servicing firms and households) | | |
| Deposits with central bank | X - a | Deposits Firm A X - a |
| Other assets | X | |

| Central Bank A | | |
|----------------|------------------------|--|
| Other assets X | Deposits Bank A1 X - a | |
| | Deposits Bank A2 X + a | |
| | Banknotes issued X | |

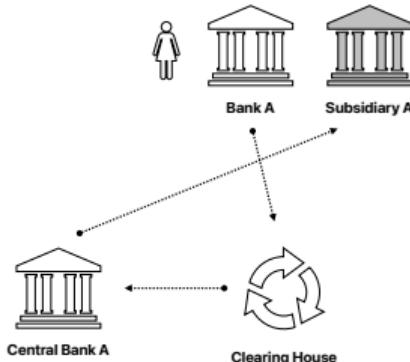


FinTech payment providers

| Household A | |
|----------------------------|---|
| Account Fintech | $x + \beta a - \beta a$ |
| Account Bank A | $x - \beta a$ |
| FintechX – subsidiary A | |
| Deposits with central bank | $x + \beta a$ |
| | Deposits Household A $x + \beta a - \beta a$ |
| | Equity to FintechX – subsidiary B $x - \beta a$ |
| Bank A | |
| Deposits with central bank | $x - \beta a$ |
| | Deposits Account Household A $x - \beta a$ |



FinTech

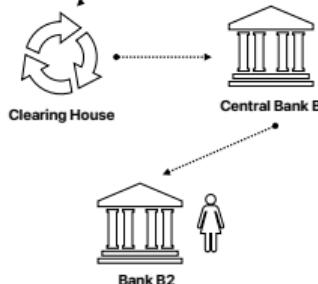


| Central Bank A | |
|--------------------------------|---------------|
| Assets | x |
| Deposits Bank A | $x - \beta a$ |
| Deposits FintechX subsidiary A | $x + \beta a$ |

| FintechX subsidiary B | |
|----------------------------------|-----------------------------|
| Deposits with Bank B1 | $x - a$ |
| Claim on FintechX – subsidiary A | $x + a$ |
| Bank B1 | |
| Deposits with central bank | $x - a$ |
| | Deposits FintechX B $x - a$ |



| Central Bank B | |
|-----------------|---------|
| Assets | x |
| Deposit Bank B1 | $x - a$ |
| Deposit Bank B2 | $x + a$ |



| Bank B2 | |
|---------------------------|----------------------------|
| Deposit with central bank | $+ a$ |
| | Deposits Household B $+ a$ |
| Household B | |
| Deposit FintechX-B | $+ a - a$ |
| Deposits Bank B2 | $+ a$ |
| | Equity $+ a$ |

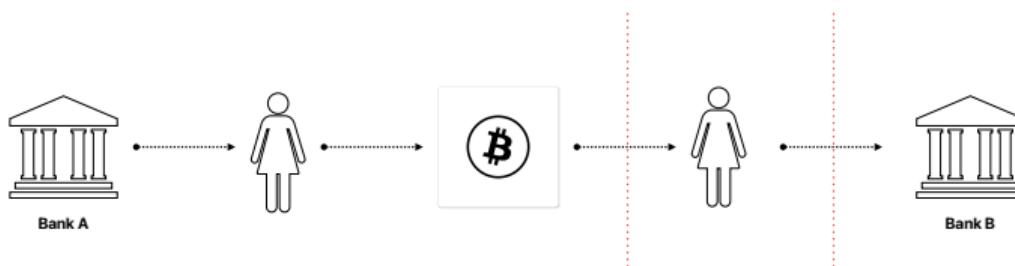
Pros and cons of FinTech payment providers

- Pros
 - Many providers → competition drives down costs
 - Especially efficient if the FinTech does not hold deposits
 - Often specialized services for specific financial services
 - Low overheads compared to banks
- Cons
 - Can low-fee income model be sustainable?
 - Often non-interoperable, closed loop solutions

Crypto and stablecoins



Crypto



Crypto with bank account



Stablecoin

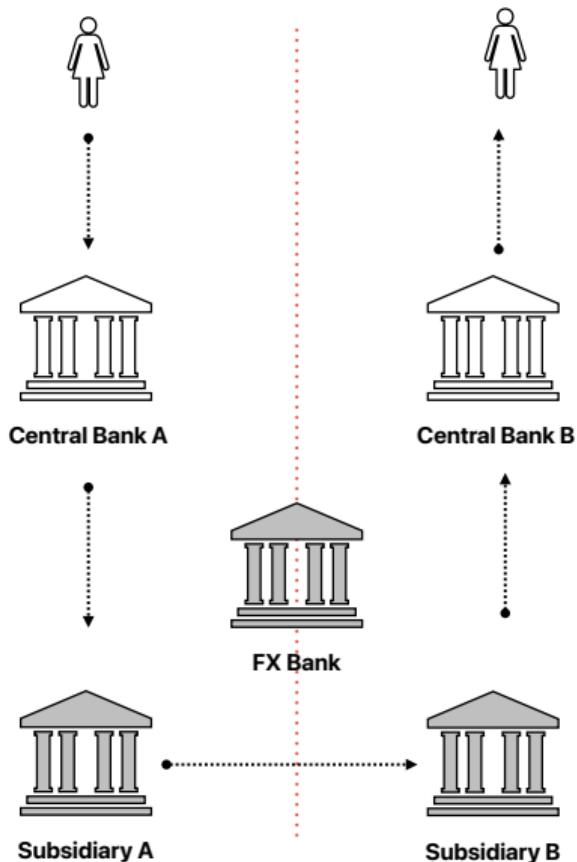
Pros of crypto and stablecoins

- Decentralized
 - No intermediaries
- Efficient
 - Payments clear in a fraction of the time
- Low to no fees
 - Lack of intermediation reduces fees
- Currency agnostic
 - Removes currency risk
- 24/7 → removes time zone risk

Cons of crypto and stablecoins

- AMT/CFT concerns
- Lack of regulatory oversight
- Does crypto meet the definition of money? → price volatility
- Threats to monetary sovereignty
- Financial stability issues
 - Large reserves required
 - Incentive to hold interest generating assets/reserves → sell-off of reserves could destabilize markets
 - Solution: hold highly liquid, safe assets → low/no interest
 - Liquidity management

Central bank digital currencies (CBDC)



Pros and cons of central bank digital currencies (CBDC)

- Pros
 - Removes the need for a bank account
 - Subsidiary bank handles forex conversion
 - Forex conversion can be handled by non-banks (non-banks can hold CBDC)
- Cons
 - Requires multinational FX banks
 - Concentrates settlement risk in a small number of FX banks
 - Requires CBDC uptake

Have we found the holy grail?

Have we found the holy grail?

- The holy grail will likely feature three solutions
 - Subsidiary FX banking (high fees!)
 - Stablecoins (high reserves required! regulatory concerns!)
 - CBDCs (uptake? high fees!)
- Key question: can we remove fees?
 - Fees are driven by costs of intermediation across border, e.g forex
- Challenge: how can we re-imagine financial services in a world where cross-border payments are instantaneous and free?