

# A history of payments, financial intermediation and regulation

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FinTech and Cryptocurrencies - University of Cape Town

## About me

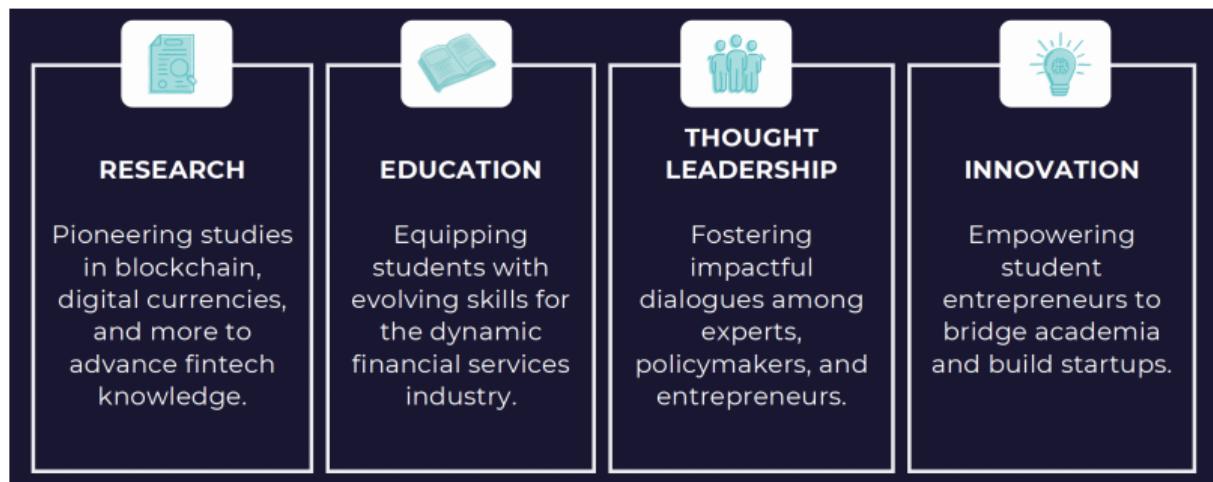
- Senior Lecturer in the School of Economics
  - Previously: visiting researcher at Oxford, New York University and Imperial College London
  - In my past life, I was a data scientist working on housing and consumer finance
- I teach: Econometrics (4016F), Policy Analysis (4028S)
- My research areas: housing finance, consumer and household finance, public finance
- I convene the MPhil in Financial Technology at UCT

# The MPhil in Financial Technology

- Flagship program: Africa's only dedicated FinTech Masters Degree
- 1-2 year interdisciplinary degree with subjects in FinTech, Economics, Information Systems and Data Science
- Full funded
- Travel opportunities each year

# The Financial Innovation Hub

- The Hub, brings together the brightest minds on the African continent to lead in the research and innovation of financial technologies
- Located within the School of Economics at the University of Cape Town
- The Hub's activities involve 4 pillars



## Why this course?

- **1.4 billion people** remain unbanked and excluded from traditional financial systems
- As of 2024, the Hub is sponsored by the **Interledger Foundation (ILF)**
- The ILF supports the research and development of digital financial systems, in particular, payments in vulnerable areas
- The ILF supports the development of the **Interledger Protocol** - an open, currency-agnostic protocol for making payments
- Goal: make sending payments as easy as sending an email



# Why this course?

- This week-long course and hackathon has 3 goals
  - (1) Teach you about money and payments
  - (2) Teach you how to use Interledger Protocol and Open Payments standards to build payment apps
  - (3) Give you the space and support to build an innovative solution at the Hackathon
- We'll be joined the entire week by the Interledger team, to give you expert support and tuition

## This week's schedule

- A history of payments, financial intermediation and regulation
- Balance sheets, settlement systems and crossborder payments
- Digital payments
- Towards a world of free and open payments

# Today

- A history of money
  - How did our modern system of money and payments come to be?
- Financial intermediation
  - What are financial intermediaries and what role do they fulfil?
- Financial regulation
  - How and why are these intermediaries regulated

# A history of money

## What is money?

- Thought experiment: imagine a world without money
- Money then, is perhaps, the most important invention of all time
- Money fulfils a very specific purpose: it facilitates trade
- However, what is money? Three key functions
  - Medium of exchange
  - Unit of account
  - Store of value

## Money as a medium of exchange

- The activity of trading goods is an essential function of human life
  - Adam Smith (1776): “Nobody ever saw a dog make a fair and deliberate exchange of one bone for another with another dog”
  - Trade also key to the division of labour Smith writes about, which forms the foundation of our society
- Money facilitates trade by making it easier to buy and sell goods relative to a barter economy
- Why? Money solves the problem of a **double coincidence of wants**
  - In a world without money, trade between two people only occurs if both people want the good the other person is trading

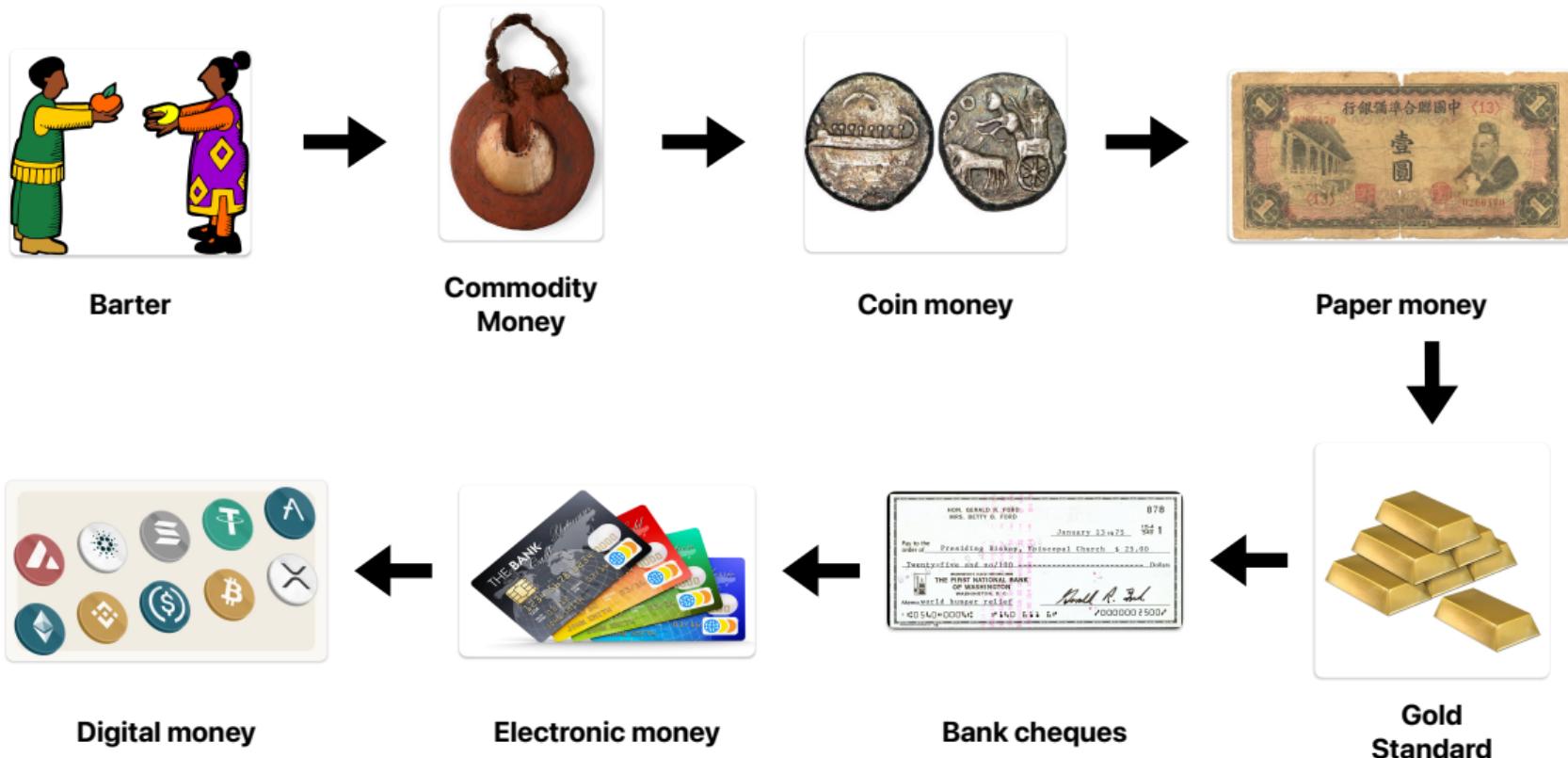
## Money as a unit of account

- Assume you manage to find a person who is willing to trade you a bus ticket for chocolate
- If the double coincidence of wants hold, how many chocolates equals a bus ticket?
- Money solves this problem, by providing a unit of account
  - This allows us to answer the question, "how much is this worth?"
- Money also reduces the number of prices in society
  - In a world with money, the number of prices equals the number of goods
  - In a world without money, the number of prices equals the number of pairs of goods
  - Without money, an economy with 1,000 goods, would need 499,500 prices

## Money as a store of value

- For money to be a medium of exchange, it must retain/store its value across time
- Money is not the only store of value
  - Other assets could be used, most notably gold, but also art, real estate, collectables etc.
  - However, money is the least volatile, the most liquid and the most widely accepted
- As a store of value, money is not perfect. Why? It depreciates with inflation

# The historical evolution of money



# Bartering



- In place from as early as 9000 BC
- Requires the double coincidence of wants
- Eventually, primitive societies begin to keep tally of trades. Why?
  - Early concepts of debt and deferred payment
  - This became increasing difficult as societies grow

# Commodity money



- Bartering becomes increasingly difficult as societies grow. Why?
  - An increasing number of trades
  - Communal goods & taxation
- Objects (e.g sea shells) begin to be used as a type of IOU. Key feature: value can be kept across time
- However, a number of practical difficulties
  - Objects are not durable
  - Objects may not be portable
  - Objects are not scarce

# Coin money



- Minted coins made from metal, stamped with the seal of the king. Many benefits
  - Durable, legitimate, hard to forge, portable, divisible, intrinsic value
- One major problem: debasing
  - Diluting precious metals with cheaper metals
  - “Good” money: nominal value = face value
  - “Bad” money: nominal value < face value
  - Gresham’s Law: “bad money drives out good”

# Paper money



- Carrying large sums of coins is impractical, especially for long-distance trade
- System of paper based money introduced in 7th century in China
  - Paper based representation of coin money
  - Represents a promissory note (IOU)
- No intrinsic value, but people trusted its worth
- 2 major difficulties
  - (1) Inflation
  - (2) Exchange rates and trade

## Gold standard



- Solution: express the value of each currency relative to gold
- Paper money can be redeemed at any point for a fixed quantity of gold
- Central banks printed paper (fiat) money and held enough gold to match this
- Solves inflation (gold is scarce) and enables trade

## Gold standard

- Three fundamental events change the world: WWI, WWI and the Great Depression
- This puts severe pressure on the gold standard in three ways
- (1) Countries increase war expenditure and abandon the gold standard to print money
  - US exports soar as they sell arms to the rest of the world, paid for in gold
  - The US begins to amass large quantities of gold
- (2) Post-war reparations deplete gold reserves
- (3) Mass withdrawal of gold - currencies at risk
- Solution: Introduction of the Bretton Woods system in 1944
  - The US dollar will be pegged to gold, and all other currencies pegged to the dollar

## Gold standard

- Over time however, the rest of the world became disgruntled. Why? Exorbitant privilege
  - The benefit the US has due to its currency being the reserve currency
  - Unlike any other country, at that time, the US paid for imports using its own currency
- In 1965, Charles de Gaulle sent the French Navy across the Atlantic to pick up the French reserve of gold and cash in their dollars
- Other countries follow suit, and US reserves deplete
- In 1971, the US leaves the gold standard

## Gold standard

- After 1974, all countries drop their peg to the US, and we have the modern monetary system of floating exchange rates
- Each currency's value is determined by market forces, demand and supply
- This is a pivotal moment in the 9000 year history of money
- For the first time, we accept money as an idea, and not a thing
- Money is the medium by which things are exchanged, and not, the value for which they are

# Electronic money



- An electronic store of monetary value on a device that may be used for making payments to entities
- Always backed by fiat currency
- First credit card issued in 1949 and first debit card in 1966
- Today, widespread use of digital wallets on smart devices
- More convenient than cash, but requires a bank account

# Digital money



- Currency that only exists digitally - not backed to fiat
- No central issuing or regulating authority
- Decentralized system to record transactions and manage the issuance of new units
- Relies on cryptography to prevent counterfeiting and fraudulent transactions
- Do they satisfy the definition of money?
  - Widely accepted, universally valuable, holds value?
  - Stablecoins offer some hope

# The three functions of money

- The history of money teaches us the importance of the three functions of money

## Medium of exchange

Widely accepted

Universally valuable

Portable

Divisible

## Unit of account

Holds value

Widely accepted

## Store of value

Holds value

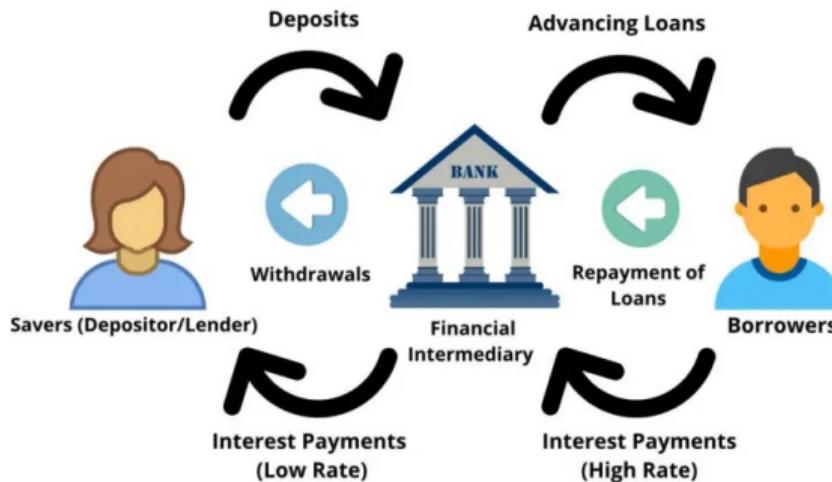
Unique / hard to forge

Durable

# Financial Intermediation

# What are financial intermediaries?

- “an entity that acts as the middleman between two parties in a financial transaction, such as a commercial bank, investment bank, mutual fund, or pension fund”



## Who are financial intermediaries?

- Banks
  - Take deposits and issue loans
- Insurance companies
  - Issue contracts that mature or come due should some contingency occur
- Pension funds, investment banks, mutual funds
  - Buy corporate bonds and stocks and transform them into annuities
- Investment banks, mutual and money-market funds
  - Hold portfolios of capital and money market instruments and transform these into shares

## What do financial intermediaries do?

- Transform assets
- Manage assets
- Process information and monitor borrowers
- Offer access to a payment system

## What do financial intermediaries do? #1: Maturity transformation

- Banks take in deposits and use that deposit base to provide loans
- This involves a maturity transformation: short-term loans are transformed into longer-term loans
  - Profits are made off the difference between the interest paid and the interest charged
- This is a critical function of financial markets
- Involves careful balancing act, especially in terms of managing liquidity
  - Banks must ensure it has enough capital to pay out depositors

## What do financial intermediaries do? #2: Screening and collecting information

- Financial institutions screen all clients
  - KYC, income verification, employment verification, credit checks etc..
- Financial institutions collect the repayment information of their clients
  - Paid on time, late payment, arrears etc..
- This information helps these institutions solve an **asymmetric information** problem
  - Asymmetric information: in a transaction, one more party has more information than the other
- Credit bureaus help financial intermediaries share their information with one another

# What do financial intermediaries do? #2: Screening and collecting information

- Credit bureaus help solve for information asymmetries across financial intermediaries



## Adverse selection

- The most prominent type of asymmetric information is adverse selection
- Famously illustrated by George Akerlof in 1970
- Akerlof (together with Michael Spence and Joseph Stiglitz) won the Economics Nobel Prize in 2001 for “their analyses of markets with asymmetric information”
- Consider the market for used cars



## Adverse selection

- Many buyers looking to buy a used car
- Buyers are willing to pay a (i) high price for a high-quality car and a (ii) low price for a low-quality car
- Many sellers, who either sell a low-quality or a high-quality car
- Buyers and sellers have asymmetric information
  - Sellers know the true quality of the car
  - Buyers do not know the true quality, but can form expectations (viewing the car, test driving etc..)
- Sellers have an incentive to always tell the client they have a high quality car

## Adverse selection

- What happens in such a market?
- (1) Sellers of low quality cars report their cars are of high quality in the hope of selling at a high price
- (2) Buyers anticipate this, which makes it difficult to judge when the seller is being truthful
- (3) Buyers assume most cars are low quality and make low prices
- (4) Sellers of high quality cars leave the market
- (5) Buyers anticipate this, and now expect all cars to be low quality and make lower prices
- The result? A race to the bottom

## Adverse selection

- Adverse selection leads to a complete breakdown of the market
- The key issue: buyers have no way of verifying information from sellers
- Many other examples of adverse selection in financial markets, such as insurance
- Key to overcoming this: more information and more verification of information

## What do financial intermediaries do? #3: Dealing with risk

- There are numerous risks in the financial system
  - Investment projects or businesses may fail
  - Borrowers may default or go insolvent
- Financial intermediaries can reduce these risks by pooling
  - Combining assets together to reduce their overall risk
  - Interest rates also help to mitigate exposure

## What do financial intermediaries do? #4: Offer access to a payment system

- Banks are the custodians of retail and commercial accounts
- A bank account allows you to make and receive electronic payments
- Intermediaries must manage the payment infrastructure
- Banks charge fees to offer this service

## Banks are a special type of financial intermediary

- Banks are special for two reasons
- (1) Banks accept deposits
- (2) Banks lend to each other, causing systemic risks
  - Bank A wants to extend a loan to a customer but does not have the capital
  - Bank A borrows from Bank B to lend to the customer
  - If Bank A goes under, Bank B is exposed
- Banks have two important regulatory functions
  - Liquidity management
  - Capital management

## Liquidity management

- For a bank to be able to lend, it needs liquid assets like cash
- If a bank does not have enough liquid assets to lend, it must borrow → increases costs
- A bank must also ensure it has enough cash on hand to repay depositors
  - This prevents banks from lending out all of its deposits
- Managing liquidity is of systemic importance to a bank. Why?
  - If a consumer believes a bank is struggling with liquidity, it may withdraw its deposits
  - Others follow → a run on the bank → bankruptcy
  - Given the expected inflows and outflows on the liability side, the asset side should be structured to meet the obligations to the depositors

## Capital management

- Most assets banks hold have risks → the value of bank assets is volatile
- If the losses of a bank exceed the bank's capital → insolvency
- The more capital the bank has, the lower the risk of insolvency
- However, the more capital is held, the less capital is lent
  - Foregone interest
  - Trade-off between returns (to shareholders) and solvency protection

# Financial regulation

# The role of the Great Depression in shaping Financial Regulation

- Up to 1929, banks operated with very few regulatory requirements
- The roaring 1920s
  - Boom in US economic growth driven by the manufacturing industry
  - The growth of cities → people moved into cities to get manufacturing jobs
  - Consumers (with lots of savings) starting investing in the stock market and making deposits in banks
  - Banks were opening in the US at a rate of 4-5 a day

# The role of the Great Depression in shaping Financial Regulation

- In 1929, an unprecedented stock market crash occurs
  - From a peak on 3 September 1929, the stock market fell 40 per cent by 29 October 1929
  - Black Tuesday → investors lost \$14 billion in one day
- Banks were heavily exposed to this crash in two ways
  - By lending money to investors to buy stock
  - By investing in the stock market itself
- Banks were forced to sell stock to satisfy their liquidity requirements
- This prompted a bank run and eventually led to the Great Depression

# The role of the Great Depression in shaping Financial Regulation

- Severe economic consequences
  - Unemployment rose from 3% to 25%
  - Average incomes fell by 40%
  - Close to 50% of all mortgages were delinquent and more than 1 million people lost their homes
  - In 1933 alone, more than 4000 banks closed

# The role of the Great Depression in shaping Financial Regulation

- The Great Depression prompted an overhaul of financial regulation
- Major policy introduced: Glass-Steagall banking bill in 1933
  - Prevents banks from using depositors' funds for risky investments
  - This leads to the separation of investor banks from retail banks
- Glass-Steagall was repealed in 1999 by the Gramm-Leach-Bliley Act
- In that time, two main innovations
  - The introduction of deposit insurance
  - Federal guarantees in the mortgage market

## Introducing Basel I and II

- Whereas Glass-Steagal & Gramm-Leach-Bliley were domestic regulation, there is a growing realization that the issues were not US-specific
- This led to the development of international regulatory standards pioneered by the Basel Committee on Banking Supervision and the Bank of International Settlements
- This led to the development of the Basel Accords, Basel I and Basel II
- Objective: promote soundness and stability of the international banking system, provide an equitable basis for international competition among banks

## Introducing Basel I

- Basel I adopted in 1988 and Basel II in 2004
- Key idea: banks should be required by law to hold enough capital to meet obligations that may arise from their assets
- “Enough capital” - minimum ratio of capital to risk-weighted assets of 8%
- Basel II introduces two extra pillars
  - Supervisory review: allows regulators to review / audit a bank's assessment of its own risks and determine whether that assessment seems reasonable
  - Enhanced disclosure and financial reporting

# Macroprudential policy post GFC

- Increased role for macroprudential policy<sup>1</sup>
  - Monetary policy: price stability
  - Macroeconomic policy: economic growth
  - Macroprudential policy: financial stability
- Macroprudential policy tool-kit
  - Capital requirements
  - Leverage restrictions
  - Liquidity requirements
- Key to this shift is the introduction of Basel III

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<sup>1</sup>Useful SARB discussion [here](#)

## Basel III and the policy response to the GFC

- The set of Basel regulations (I, II and III) refer to a set of banking regulations set by the Basel Committee at the Bank for International Settlements
- Basel III was introduced in 2009 in response to events in the crisis
- Two key features
  - **Liquidity Funding Ratio (LCR)**
  - **Net Stable Funding Ratio (NSFR)**
- The adoption of Basel III has major implications for the mortgage market in SA

## Liquidity Funding Ratio

- Bank assets can either be liquid or illiquid
  - Liquid - cash, or assets which can be quickly converted to cash
- Bank assets can either be high or low quality
  - High quality - can be converted to cash with little to no loss in value even in times of economic stress
- LCR: banks must hold enough high-quality liquid assets to fund cash outflows for at least, the next 30 days
- Prevents a run on the banks

## Net Stable Funding Ratio (NSFR)

- A core activity of banks involves matching liabilities to assets
  - To give out a loan, a bank must finance this
  - Various loan options (secured, unsecured, duration) and various funding options (short-term deposits, fixed-term deposits, debt, equity)
- Pre-GFC: no requirement for duration match between assets and liabilities
- Basel III: banks must fund their activities with sources of funding with the appropriate duration
  - Aims to solve the duration mismatch between short-term liabilities and long-term assets

# Key takeaways

## Key takeaways

- 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