Digital payments

Allan Davids

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Today

- Up to now, we've focussed exclusively on cash and bank transfers
- However, there have been three major digital payment innovations that currently shape our payment system
  - Debit cards
  - Mobile money
  - Instant payment
- We'll look at three short case studies today

Debit cards

Debit cards

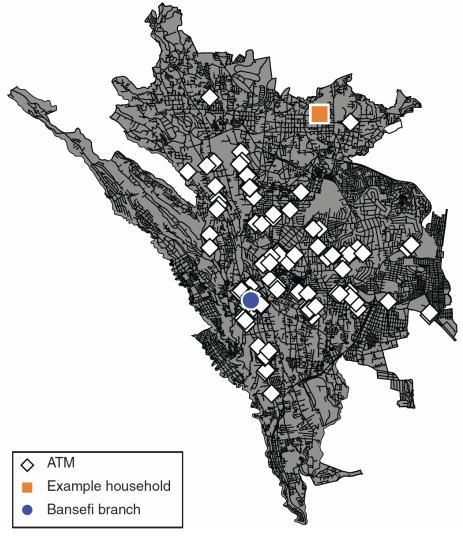
- In Mexico, recipients of government grants receive their grants in a bank account
- Historically, no debit cards were provided
  - Households need to visit a bank branch to withdraw government grant
  - Only 500 branches countrywide - median distance to branch is 4.8km
  - Accounts of barely used - 89.9% of people make one withdrawal, withdrawing 99.5% of their balance
- This system is in place between 2002 and 2009

Debit cards

- In 2009, the Mexican government begins to issue Visa debit cards
  - Households can now withdraw or check balance at any ATM
  - Can make payments at any store accepting Visa cards
  - Two free withdrawals each month
- What impact do debit cards have on consumers?[1]

[1] In the following slides, I summarize numerous papers by Sean Higgins

Debit cards reduce the distance to withdraw cash



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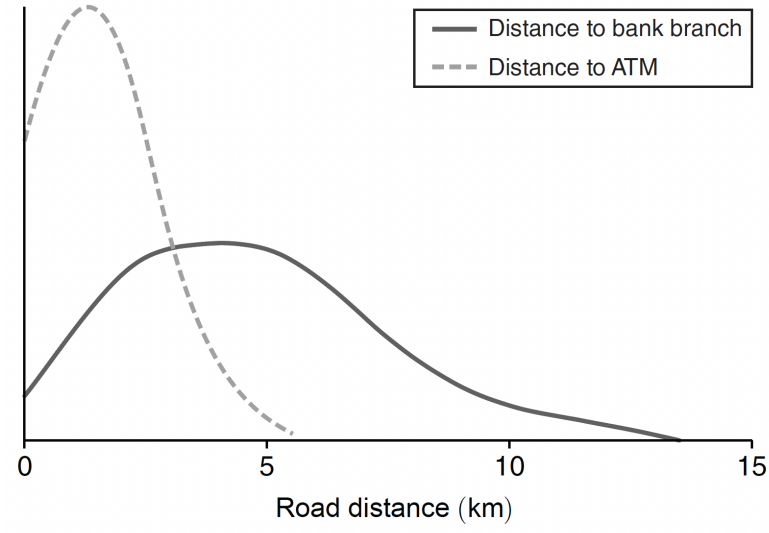
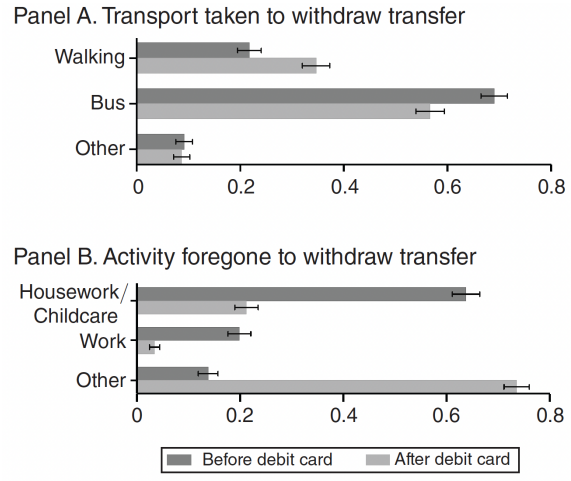


Consumers start walking to withdraw, saving money and time



Debit cards change consumer behaviour

- Within two years, the amount of people who save using their bank account goes from 13% to 87%
- Savings rise to on average, 2% of income
  - However, little saving in the first year. Why? A lack of trust
  - ATMs and debit cards reduce monitoring cost
  - The average consumer withdraws most of their balance in year 1, and increases the amount of balance checks they make
  - Saving only rise in year 2
- Driven by low monitoring costs

Debit cards create positive externalities

- After debit cards roll out, corner stores buy POS systems
  - 2 years after debit cards rolled out, 20% more POS devices in corner stores
  - Richer consumers shift 13% of their supermarket spending to corner stores
  - Corner stores see profits rise by 20%
- The roll-out of debit cards to a portion of the population, increases uptake
  - 2 years after debit cards rolled out, 21% increase in debit card adoption

What can we learn from Mexico's experiment?

- (1) Just because people have a bank account, does not mean they will use the features of a bank account
- (2) An account that is difficult to withdraw from is of little use
  - If people incur significant transaction costs to accessing money, they will simply withdraw everything
- (3) Building trust in financial institutions is critical
  - In this example, having a bank account does not prompt people to save
  - Only after they establish trust, do they begin to save
- (4) Technology has externalities

Mobile money

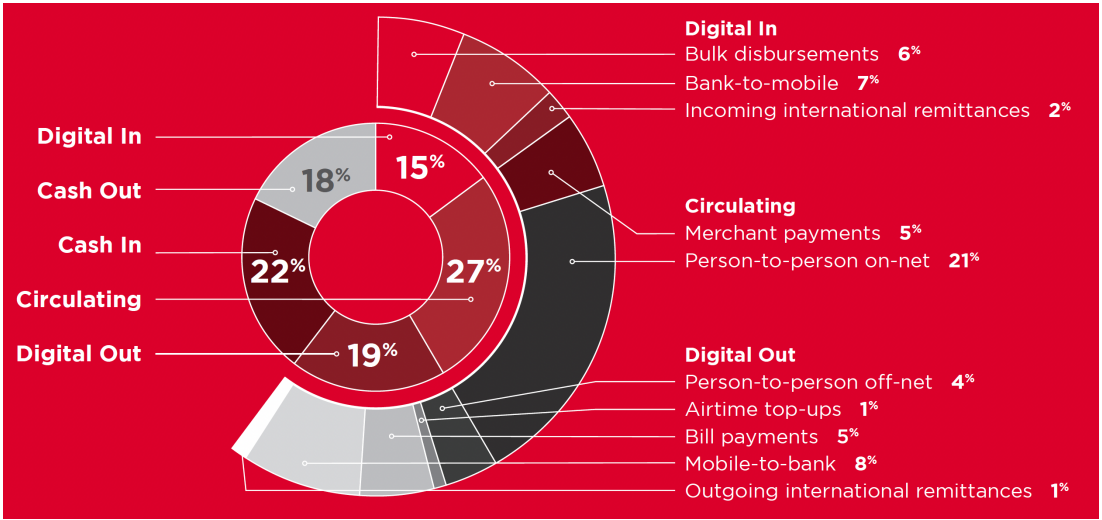
What is mobile money?

- Payment account that lives on a phone and operates through a menu on a SIM card
- Enables mobile phone owners to deposit, transfer and withdraw funds without owning a bank account
  - Mobile money is not mobile banking, which requires a bank account
- Most prominent example: M-PESA in Kenya
- Uses: P2P payments, paying bills, saving, P2B payments, receive wages + grants
- Cash is deposited into mobile money account via an agent
- Infrastructure provided by telecommunications companies
- Mobile money therefore lies outside of the financial system $\rightarrow$ shadow banking

Mobile money is big business

- In 2023
  - 1.75 billion users
  - 85 billion transactions made worth $1.4 trillion
  - $29 billion of remittances paid
  - $75 billion in bills paid
  - 40% of mobile money providers offer credit, 44% offer savings, 23% offer insurance
  - 47% of all accounts in Sub-Saharan Africa

How do people use mobile money



Three key components

- (1) Users
  - Make transactions
- (2) Agents
  - Take deposits, issue mobile money, pay cash
- (3) Trust accounts
  - Store deposits

Mobile money agents

- The money in a mobile money account is called **e-money**
  - Holds one-for-one parity with fiat
- Cash is deposited into mobile money account via an agent
- Agents get an allocation of e-money they can sell
  - Primary role: manage their e-money and fiat money inventory
- Agents are widespread: in 2023, 18.6 million agents worldwide

Trust accounts

- All fiat underlying mobile money is typically held in trust accounts, administrated by commercial banks
- Trust accounts are owned by users
  - Each user holds a tiny fraction of the trust account
- However, a user cannot deposit or withdraw from the mobile money account at the commercial bank holding the trust account
  - Deposits and withdrawals can only happen via an agent

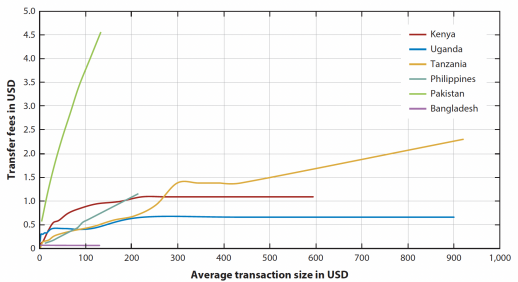
What explains the popularity of mobile money? What problem does mobile money solve?[2]

- (1) Does not require opening a bank account
- (2) Reduces physical transaction costs
- (3) Safer than carrying cash, especially in high-crime environments

[2] In the following slides, I summarize numerous papers by Tavneet Suri

Mobile money does not require opening a bank account

- Bank accounts require extensive KYC
- Opening a mobile money account requires an ID and a cellphone $\rightarrow$ opened in minutes
- A common misconception is that people prefer mobile money given there are low fees



- If people aren't using mobile money for the low fees, why do they use it?

Reduction in physical transaction costs

- What is a physical transaction cost? Effort, time, transport etc.
- In many developing countries, transactions travel far distances, especially in rural areas
  - In Kenya, in 2008, the average transaction travelled 200km, i.e. a $5 bus ride
  - Making a cash transaction, therefore incurs a $5 fee + the opportunity cost of the time taken to travel
  - Mobile money makes this 200km long transaction digital, reducing the transaction cost to the M-PESA fee of $0.35
- However, users still need to deposit money and withdraw money from agents
  - How prevalent are agents?

Agents are more widespread than banks

Country	Number of agents by provider[a]		Number of agents[b]	Number of bank branches[b]
	Provider	Number of agents		
Pakistan	EasyPaisa	10,500	NA	NA
Philippines	GCash	18,000	NA	NA
Kenya	M-PESA	20,500	65,569	10,619
Uganda	NA	NA	41,794	477
Tanzania	NA	NA	45,429	579
Nigeria	NA	NA	3,567	4,989
Bangladesh	NA	NA	31,755	8,641

Agents are closer to users than banks

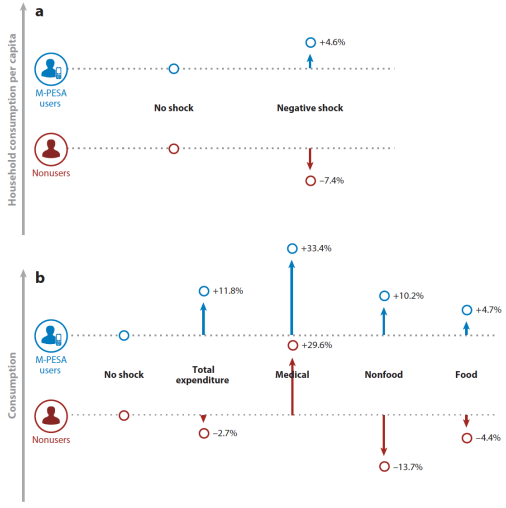
Year	Bank branches	Bank agents	Mobile money agents
2007	9.2 km	NA	4.9 km
2011	7.0 km	5.2 km	1.9 km
2015	6.0 km	1.9 km	1.4 km

- Much like debit cards in Mexico, improving accessibility is key!

Safer than carrying cash

- Crime is a risk to transacting in cash and saving
- Mobile money reduces the need to carry cash $\rightarrow$ safer transactions
- Mobile money also provides a safe way to save
- Important intrafamily effects, especially for women

How have consumers benefited from mobile money? The case of M-PESA



What can we learn from mobile money?

- (1) Financial inclusions does not require a bank account!
  - Important implications for undocumented foreigners / refugees
- (2) Accessibility is key!
  - Mobile money's success is driven by the network of agents
- (3) e-money solves a safety issue in a market where cash is king
- (4) An account servicing entity need not be a bank!

Instant payments in Brazil

The payment system in Brazil

- Much like many other countries, fees on payments in Brazil are substantial
  - Sending 50 reais (R170/$31) to someone, would incur a transaction fee of 16 reais (R55/$3)
  - Credit card fees equal 2% of the purchase
- As a result, consumer preferred to avoid digital payments
  - Instead, a system of payment slips (*Boleto*) are used
- As a result, cash is king - in 2017 only 57% of the population had a bank account
  - Concerns about financial inclusion

Introducing Pix - a instant RTGS system in Brazil

- In November 2020, the Brazilian Central Bank (BCB) launch Pix
- Features
  - (1) Instant settlement $\rightarrow$ Pix settles in 3 seconds
    - Average settlement for debt cards is 2 days, for credit cards 28 days
  - (2) Available 24/7
  - (3) Universal - all banks mandated to implement
  - (4) Low transaction costs
    - Free for individuals, 0.33% fee for firms (vs. 1.13%-2.34% for cards)
  - (5) Secure - settles in central bank money
  - (6) Payment by alias
    - Users can be paid using their phone number, email, QR code, instead of account number

Unprecedented takeup

- In the first year of Pix
  - 45 million Brazilians make their first digital bank transfer
  - Consumers save 1.5 billion reais (R5 billion) in fees
  - Businesses save 5 billion reais (R17 billion) in fees
- Today
  - 155 million transacting users (75% of population)
  - 15 million transaction companies
  - 42 billion transactions a year, with 17.2 trillion reals (R58 trillion)
  - 82% of the population now have bank accounts (57% in 2017)
  - The preferred method of payment in Brazil

Pix is going global

What can we learn from the unprecedented success of Pix?

- (1) Pix is successful as money because it is universally accessible
  - Making a Pix is as easy as paying cash
  - Every merchant accepts it (QR codes and aliases are intuitive)
  - Every bank offers it
- (2) Central Bank / Clearing House driven solutions are powerful
  - Regulators can enforce compliance
  - Regulators can also subsidize costs, driving down fees $\rightarrow$ important in markets prone to monopolies and oligopolies
- (3) Standardization is powerful
  - BCB Governor: “We will open everything that we did with Pix to all central banks that want to copy it, for free,”

What payment problems are we still trying to solve?

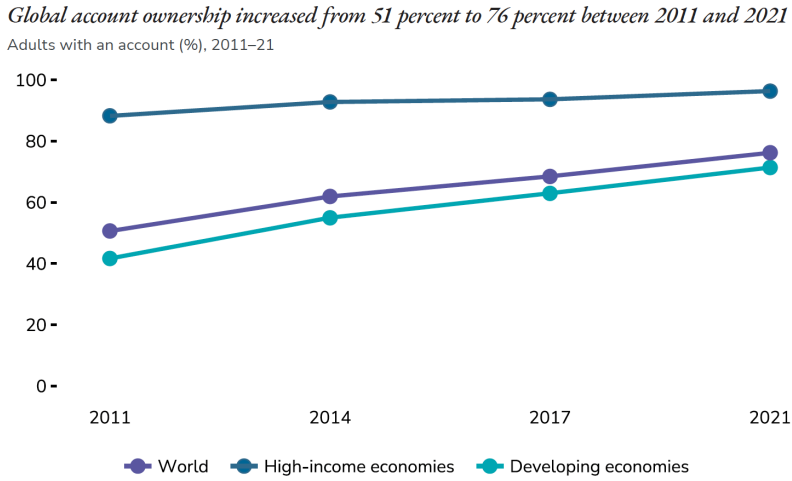
What payment problems are we still trying to solve?

- (1) Can we implement a feasible digital version of cash?
- (2) Interoperability between different mediums of settlement
- (3) Remittances
- (4) Government-to-person (G2P) payments

(1) Can we implement a feasible digital version of cash?

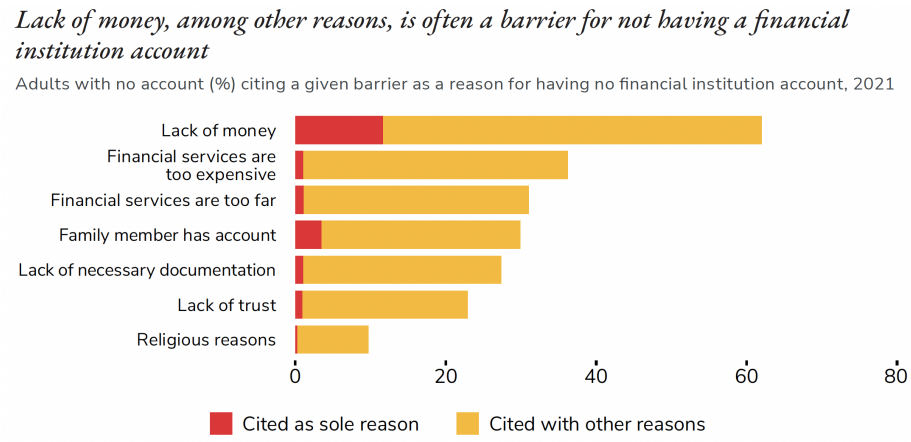
- Major questions
  - Can we make digital cash as privacy preserving as cash?
  - Universal access? Resilience? Performance?
  - Can we do this without a bank account? If not, how to increase bank account uptake?

Bank account ownership is rising[3]



[3]Source: Global Findex database

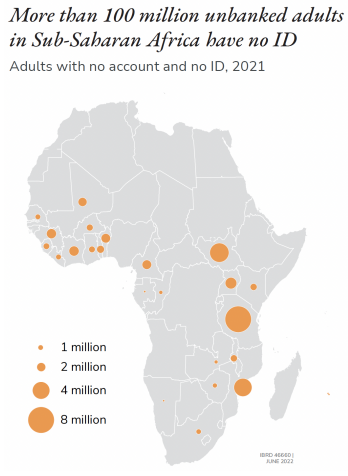
Why do you not have a bank account?[4]



[4]Source: Global Findex database

Lack of IDs are a major impediment[5]

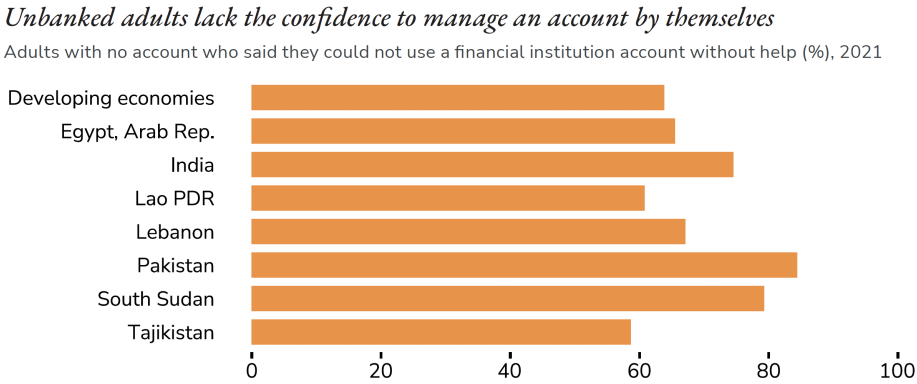
- How do we build products and services for undocumented people?



[5]Source: Global Findex database

Financial and technological literacy[6]

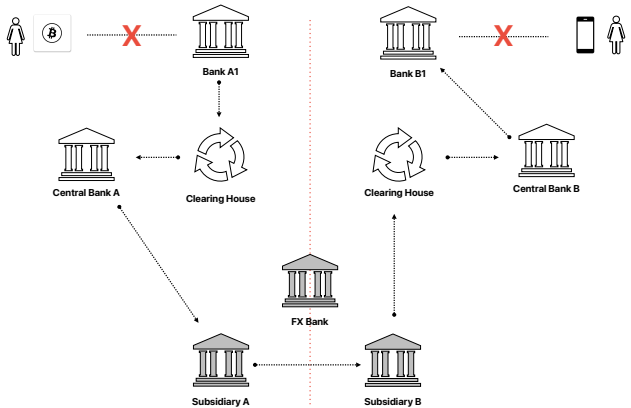
- How do we build products and services that mimic the intuitiveness of cash?



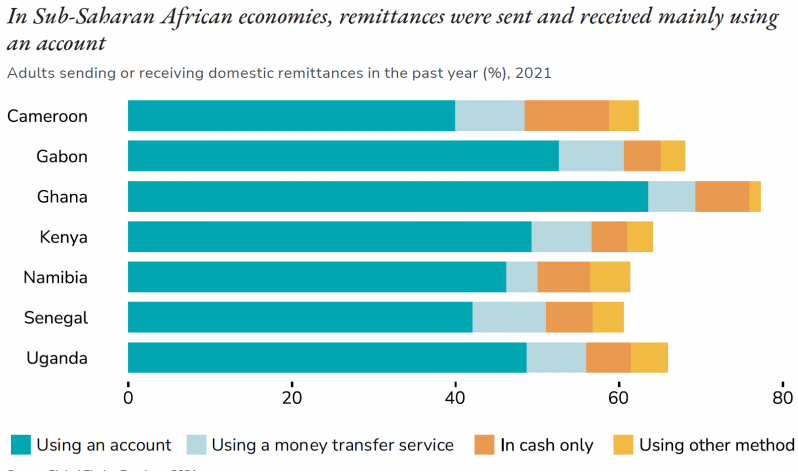
[6]Source: Global Findex database

(2) Interoperability

- In the previous lecture we saw that payments require counterparty links
- This is simple in a world of only bank accounts
- How do we enable this in a world of numerous settlement mediums?



Remittances



Government-to-person (G2P) payments