



UNIVERSITY OF NICOSIA
ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

DFIN-511

Introduction to Digital Currencies

Session 12

Digital Currencies and the Developing World

Objectives of Session 12

- Understanding digital currencies' potential impact on infrastructure development and non-traditional payment systems (M-Pesa)

We will look at:

- What “*financial inclusion*” and “*financial communication*”, on a global scale, could mean for underdeveloped countries
- An existing example where development leapfrogged the conventional financial services infrastructure through the use of digital transactions
- The potential that may exist on alternative avenues of infrastructure development, what transaction disintermediation may mean for developing regions, and how conventional infrastructure could potentially be leapfrogged

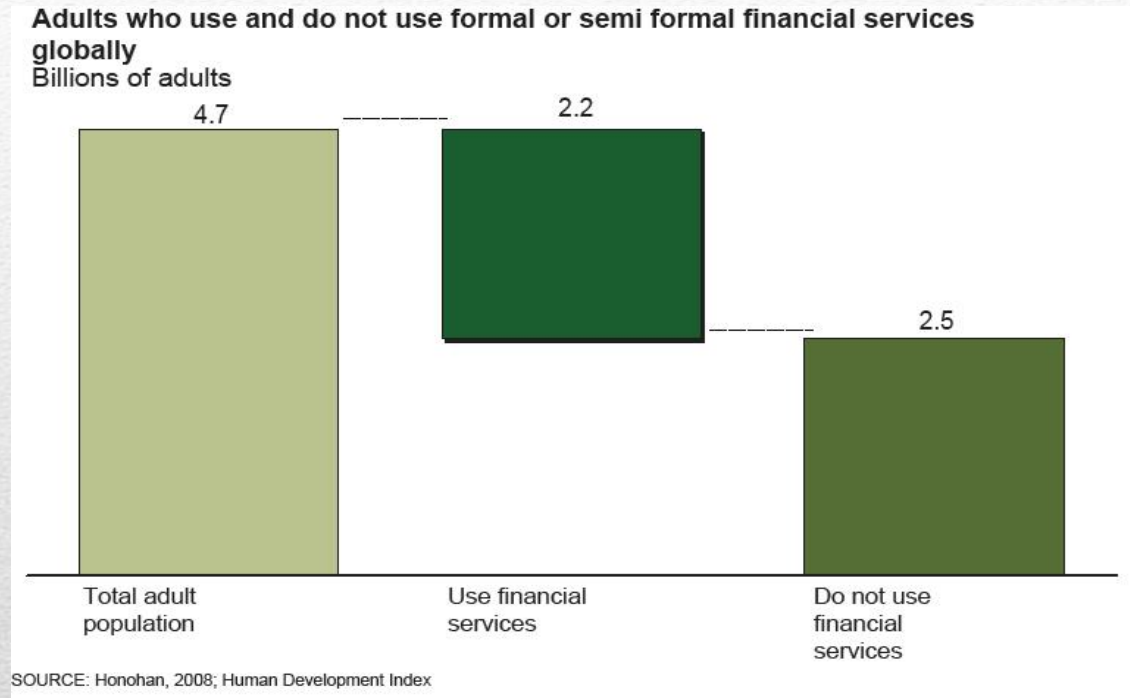
Agenda

- Financial Inclusion and Financial Communication
- The case of M-Pesa
- Infrastructure by Leapfrogging
- Conclusions
- Further Reading

Financial Inclusion and Financial Communication

The “unbanked”

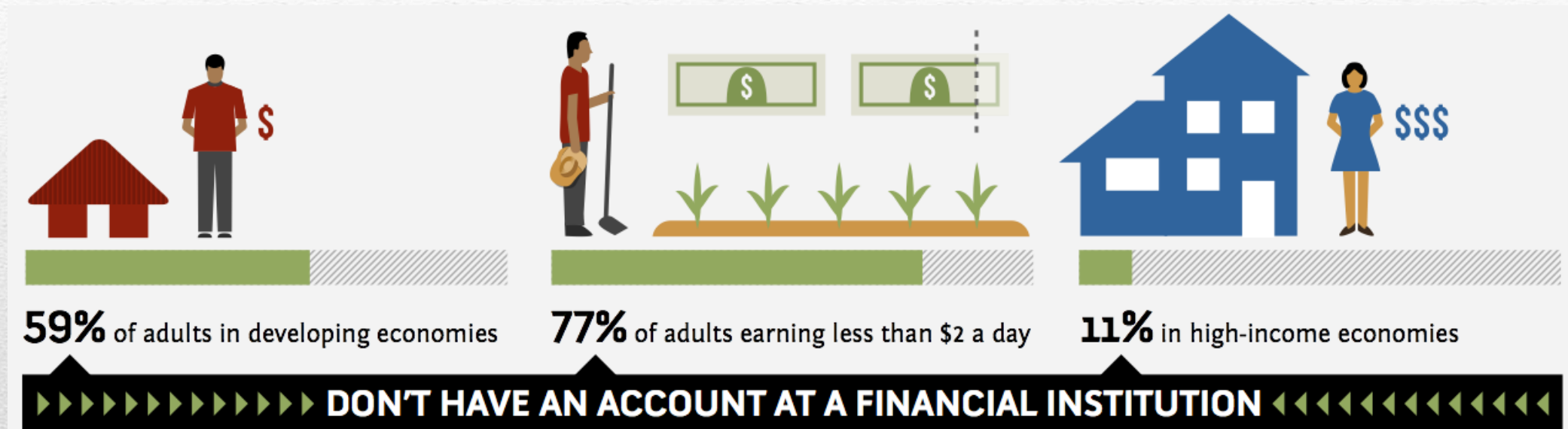
- Research from the World Bank and McKinsey, indicates that more than half of the global populace of adults in the world, have no formal access to conventional financial services
- “*Formal access*” in this case, means what the World Bank calls “*financial inclusion*”, access to bank accounts, lending services from financial institutions and access to credit and debit cards



Source: [Half The World is Unbanked](#)

Who are the “unbanked”?

Source: [Who are the unbanked?](#)

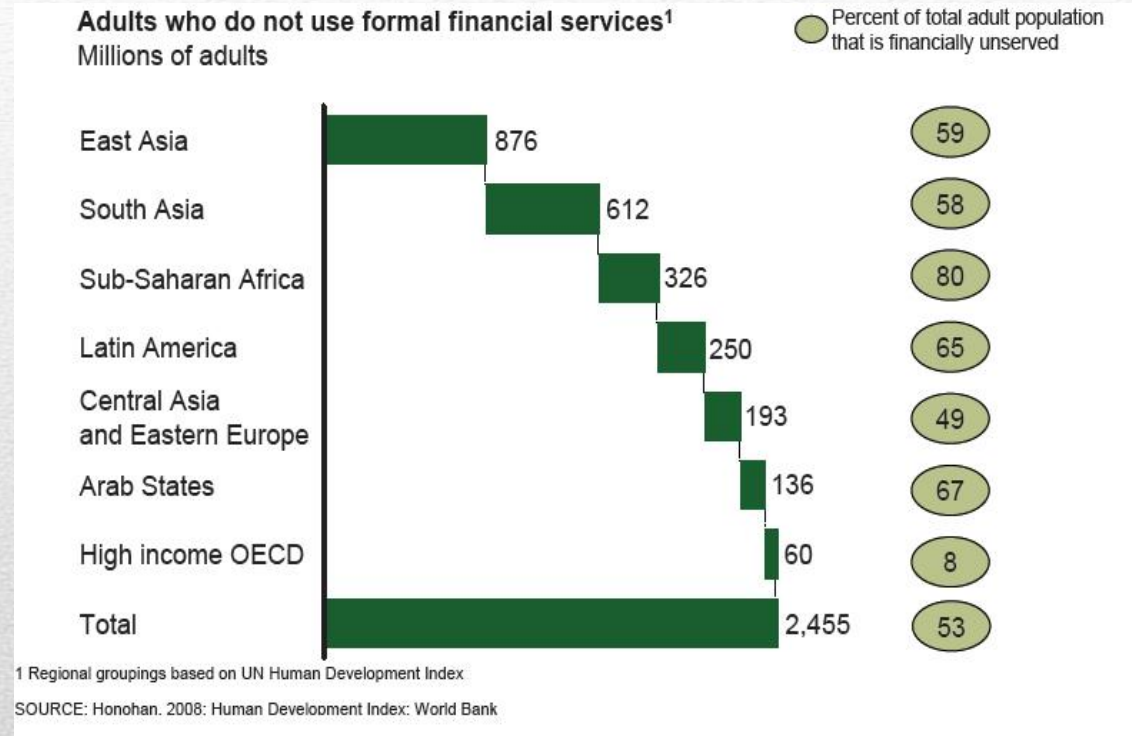


The World Bank created the [“Global Findex”](#), a global financial inclusion database to measure the use of financial services and identify the population with the greatest barriers to access.

Why are people unbanked? According to the Global Findex, *“3/4 of the world’s poor do not have a bank account, not only because of poverty, but also due to costs, travel distance and paper work involved.”*

The poorest and the excluded

- At the same time, and as would probably be expected, the poorest regions enjoy less financial inclusion
- This impacts access to all types of conventional financial services, including remittances, depository accounts and lending, for people in rural or undeveloped regions
- **65.5% of the poorest 2 billion adults have no access to formal financial services**

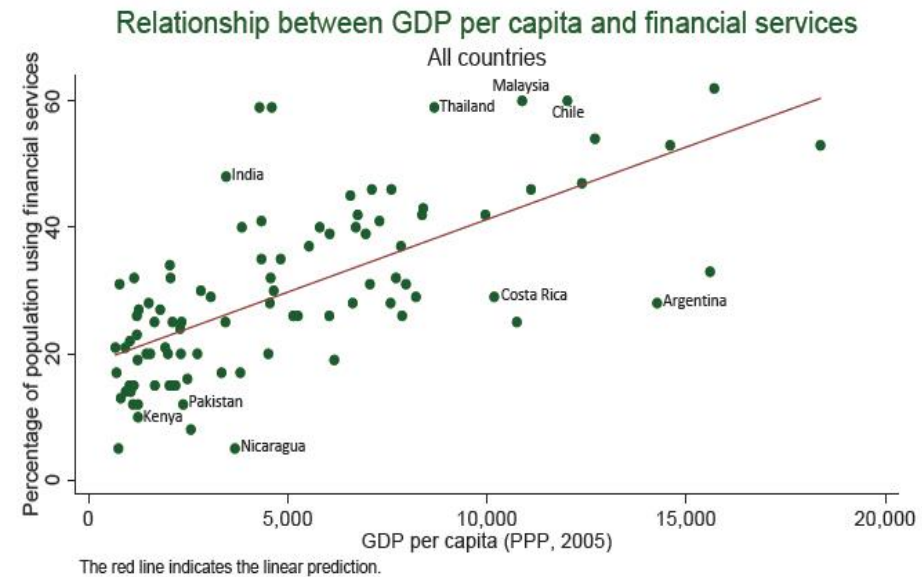


Source: [Half The World is Unbanked](#)

Financial inclusion and GDP

- The same study, positively correlates Financial Inclusion with increased GDP. While this does not prove that Financial Inclusion causes increases in GDP, it could mean that financial service providers are favoring higher GDP countries to provide services to
- Without being connected to these core elements of the global financial system, it is exceedingly hard for people to participate efficiently in the economy; trade and transact with the rest of the world

Correlation between levels of financial inclusion and GDP per capita for Arab states, Africa, Asia and Latin America (for countries with complete data)



SOURCE: Honohan, 2008; Human Development Index; World Bank

Source: [Half The World is Unbanked](#)

Regional differences in Financial inclusion



Have saved at a formal financial institution in the past 12 months:

EAST ASIA & PACIFIC

28%

REST OF THE DEVELOPING WORLD

10%



Have a credit card:

LATIN AMERICA & CARIBBEAN

19%

REST OF THE DEVELOPING WORLD

5%



Have used a mobile phone to pay bills, send or receive money in the past 12 months:

SUB-SAHARAN AFRICA

16%

REST OF THE DEVELOPING WORLD

3%



Account holders use their accounts to receive wages:

EUROPE & CENTRAL ASIA

61%

REST OF THE DEVELOPING WORLD

32%

\$0.00

Zero deposits and withdrawals in a typical month:

MIDDLE EAST & NORTH AFRICA

17%

REST OF THE DEVELOPING WORLD

10%

SOUTH ASIA

Have a formal account:



● MEN 41%

● WOMEN 25%

(The highest gender gap, relative to other regions)

Source: [Who are the unbanked?](#)

The unbanked can gain financial access



GOING MOBILE

The Global Findex shows mobile banking may help historically unbanked regions gain financial access.



2/3

OF ADULTS

worldwide without an account cite lack of money as the obstacle to use of formal financial services.



1/3

OF ADULTS

also blame the cost of opening and maintaining an account or the banks being too far away.

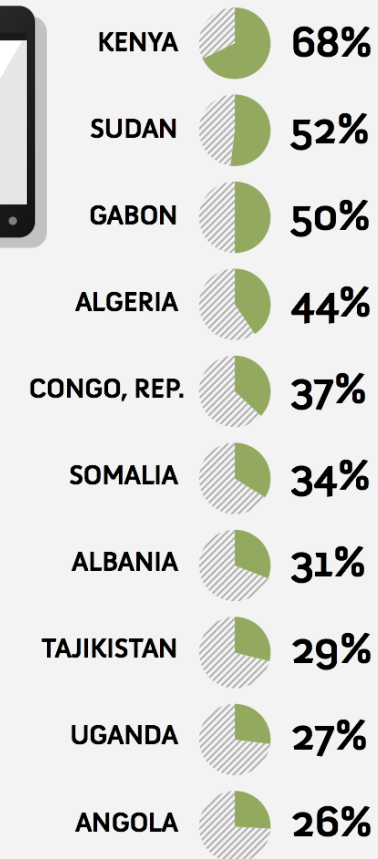
SUB-SAHARAN AFRICA



16%

In Sub-Saharan Africa, where traditional banking has been hampered by transportation and other infrastructure problems, mobile banking has expanded to 16% of the market.

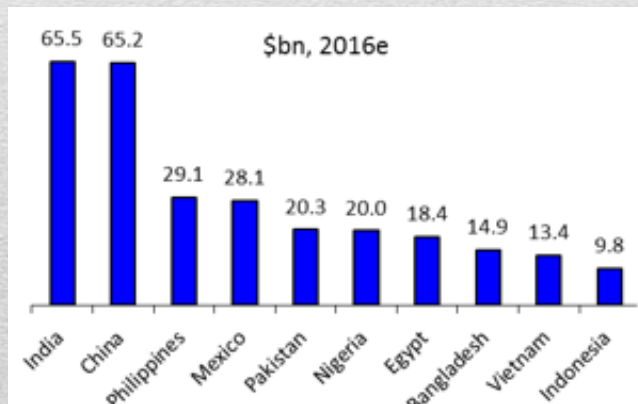
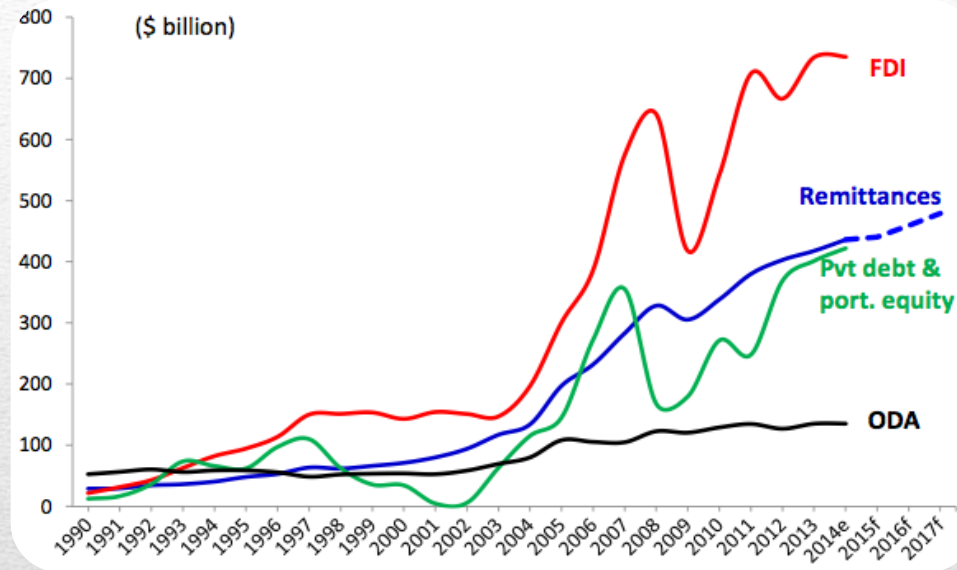
Adults reporting using a mobile phone for money transactions:



Source: [Who are the unbanked?](#)

Remittances growing moderately

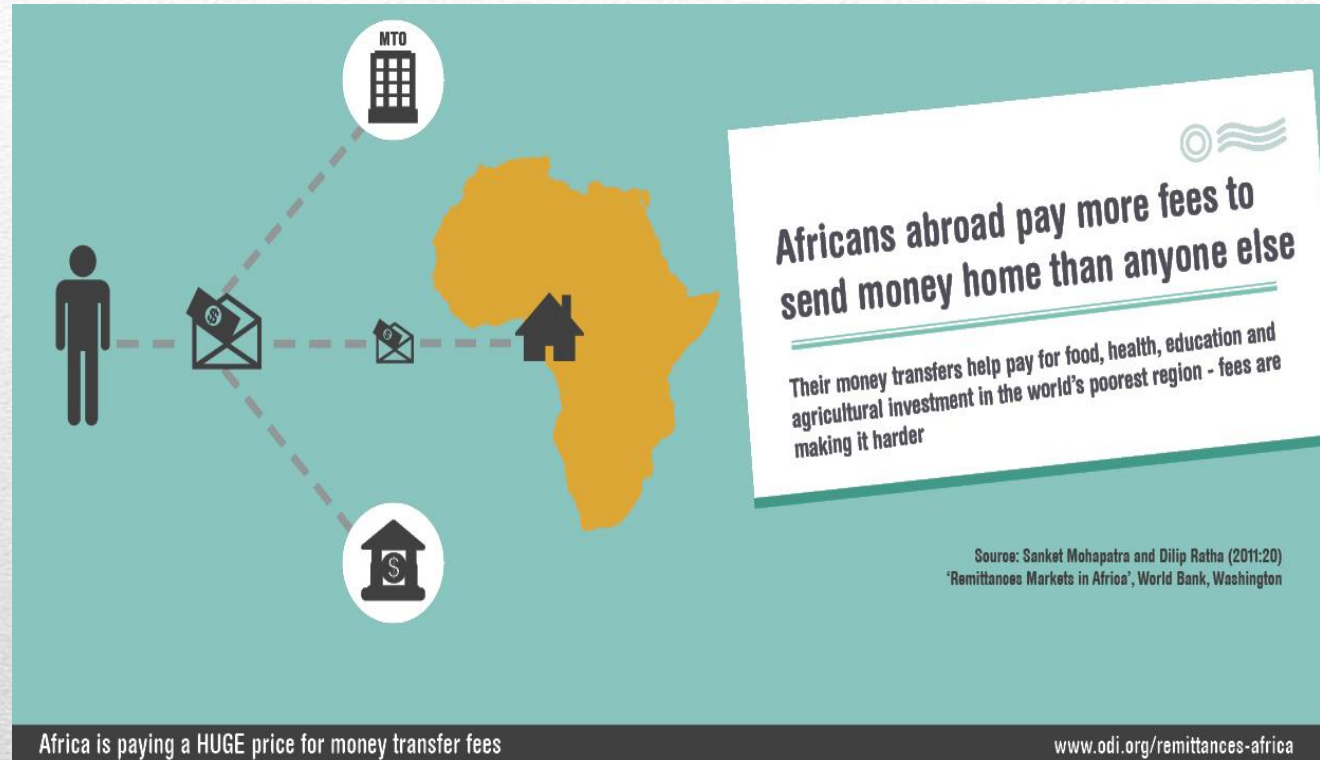
According to World Bank [research](#) :



	2010	2013	2014	2015	2016e	2017f	2018f
	(\$ billions)						
Low and Middle Income	339.0	425.7	442.7	438.6	442.0	457.3	473.4
East Asia and Pacific	94.1	113.4	121.8	126.7	129.4	134.4	139.7
Europe and Central Asia	37.4	55.2	51.8	40.1	38.5	41.1	43.7
Latin America and Caribbean	56.5	61.8	64.1	68.3	72.6	75.3	78.1
Middle-East and North Africa	39.0	50.0	54.3	51.2	52.0	53.7	55.4
South Asia	82.0	110.8	115.8	117.7	115.0	117.6	120.3
Sub-Saharan Africa	30.1	34.5	34.9	34.6	34.4	35.3	36.1
World	462.1	574.0	596.6	580.6	585.1	606.4	628.8
<i>Memo: Low and Middle Income (previous income classification)*</i>	332.9	418.3	434.3	431.2	435	449.8	465.3
	(Growth rate, percent)						
Low and Middle Income	11.4	5.2	4.0	-0.9	0.8	3.5	3.5
East Asia and Pacific	20.0	6.8	7.4	4.1	2.1	3.8	4.0
Europe and Central Asia	5.1	18.0	-6.2	-22.5	-4.0	6.7	6.4
Latin America and Caribbean	2.6	2.2	3.8	6.5	6.3	3.7	3.8
Middle-East and North Africa	18.2	2.5	8.6	-5.7	1.5	3.3	3.2
South Asia	9.4	2.6	4.5	1.6	-2.3	2.2	2.3
Sub-Saharan Africa	9.6	0.4	1.0	-0.8	-0.5	2.5	2.3
World	8.5	5.3	3.9	-2.7	0.8	3.6	3.7

But fees in many countries remain high

- Service facilitators and intermediaries, whether in remittances or other conventional financial services, usually draw a heavy burden on the local rural populace, chipping away at limited income sources
- According to the World Bank report, the global average cost of sending remittances fell to 7.9 percent of the value sent, compared to 8.9 percent a year earlier.
- To send money in Africa often costs more than 10% on average and users are limited to an oligopoly or a duopoly or choices
- The reasons for this may vary but generally include the lack of competition and the lack of transparency in how these services draft their fee structures



Source: [ODI](http://www.odi.org/remittances-africa)

Hyperinflation

- Hyperinflation (whether due to war or bad government policies) is also much more commonly found in developing nations
- Zimbabwe's hyperinflation ended up destroying their currency, and suspending all trades with it indefinitely.
- Several Latin American countries (Argentina and this year, especially Venezuela) have also experienced extreme financial and currency disruption, with extremely high inflation



Source: [Wikimedia Commons](#)

- With regards to the African countries that have displayed very high inflation rates in the recent years, some of them include:

South Sudan: 79%

Sudan: 32%

Ethiopia: 23.4%

Eritrea: 17%

(Data are estimates up to 2012)

Africa has the lowest penetration

- African enterprises and households are less likely to use financial services than their peers in other developing countries ([Beck,2013](#))
- In India for instance, private initiative appears to have made more progress to attract the rural communities, opening hundreds of stores in rural locations to facilitate and service those without financial inclusion
- In 2013, ICICI Bank — India's largest, private-sector lender in terms of assets — has more than doubled its rural network to 656 branches ([WSJ, 2013](#))
- The apparent inability of conventional branch banking to scale has led the Reserve Bank of India to grant “[experimental](#)” licenses in an effort to spread financial inclusion through mobile platforms, as phone usage proliferates, and following the success of numerous mobile banking efforts as we’ll see.



Source: egov.eletsonline.com

The case of M-Pesa

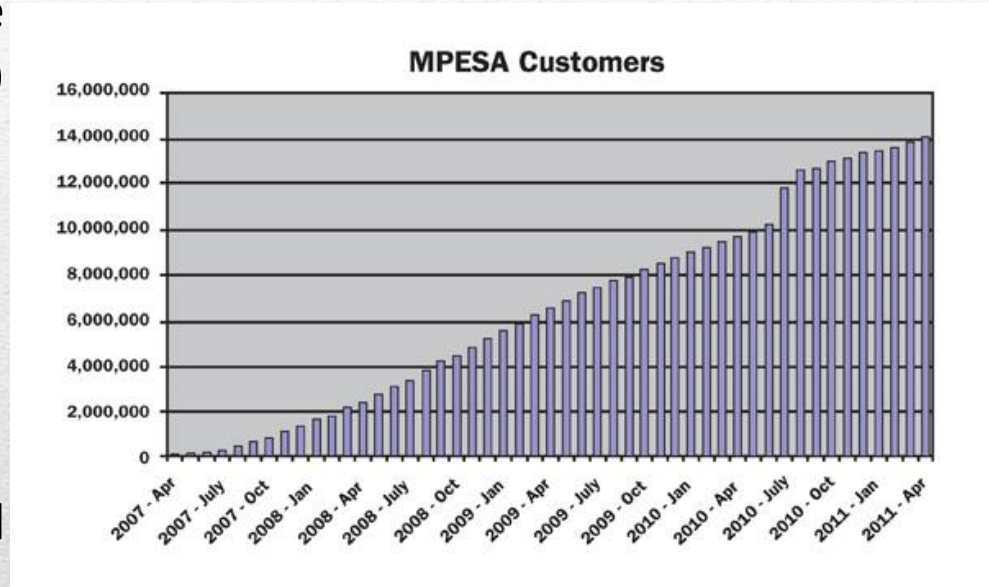
M-Pesa

- In 2007, there were only 2.5 million bank accounts in a population of 39 million in Kenya. Given the lack of traditional banking infrastructure, mobile phone users began bartering prepaid airtime for other products and services (a commodity currency)
- In 2007 Safaricom, the leading mobile phone company in Kenya, launched M- Pesa, allowing its subscribers to send and receive funds with SMS
 - M-Pesa allows for transactions (capped at a maximum of \$500) at relatively low costs compared to existing financial infrastructures
 - There are no monthly fees and fees are only incurred once performing an action such as sending funds
 - When sending funds to an unregistered user, the sender pays a fee, providing an incentive to convince unregistered users to register
 - Users may use the services as a peer-to-peer services or to pay bills



A resounding success

- As of 2014, there were over 18 million registered M-users, representing a large portion of the adult population of Kenya (in only 7 years) and 79,000 agents!
- By some metrics, due to M-Pesa, Kenya, a developing economy, has the most advanced per-capita mobile money market in the world
- M-Pesa serviced what was originally considered a niche market, where traditional financial institutions have been previously unwilling to serve, mainly due to low profit margins...**today, 25% of Kenyan GDP flows through M-Pesa!**



Source: safaricom.com.ke

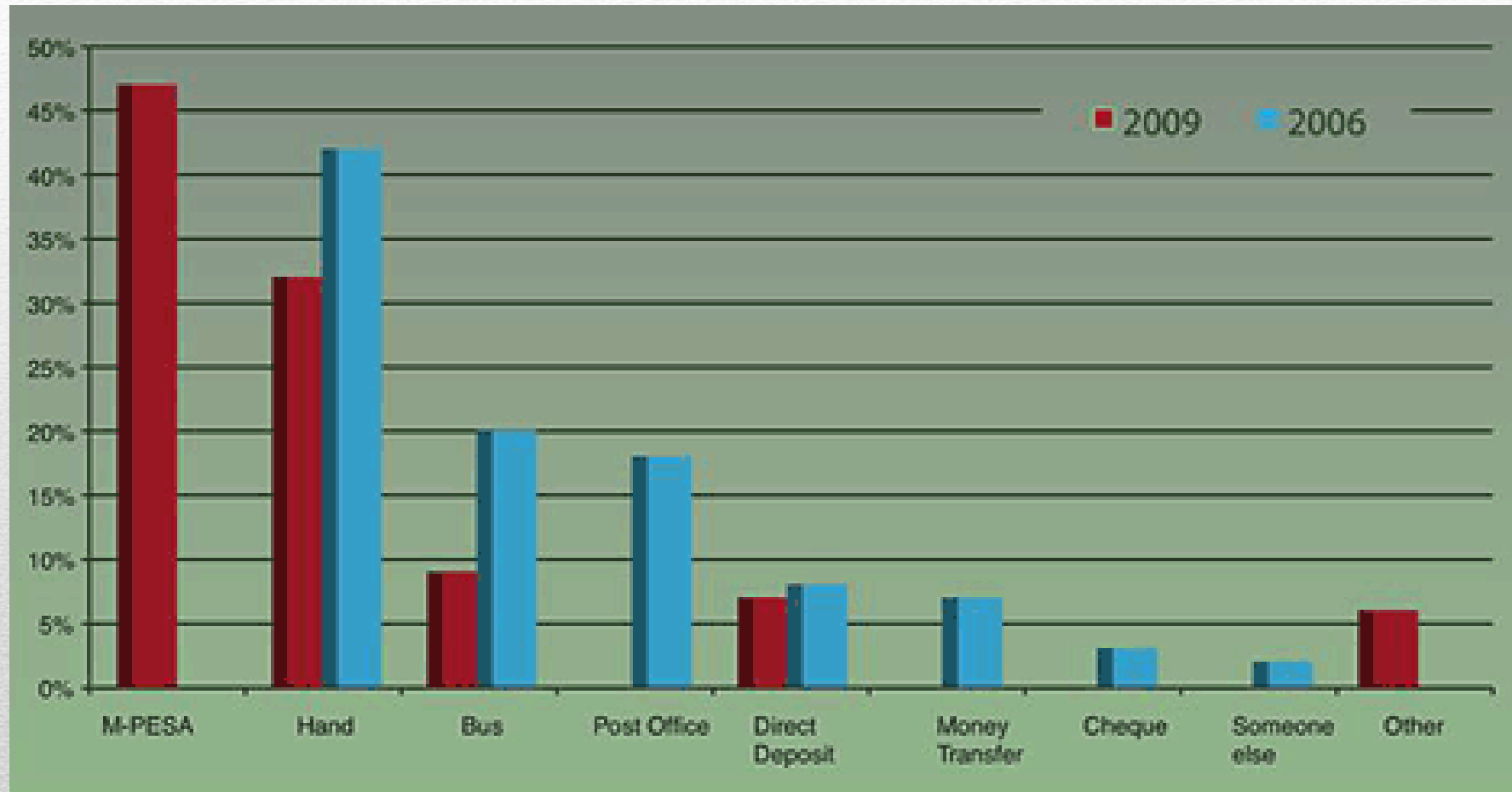
M-SHWARI and M-KESHO

- The introduction of M-KESHO (initially offered in May 2009 in partnership with Equity Bank) gave M-Pesa account holders mobile access to traditional bank accounts on a 24/7 basis. Like M-Pesa accounts, M-KESHO has no monthly or registration fees
- M-SHWARI was introduced in 2011 in partnership with CBA Bank and provides short-term loans (instant decisions, 30 day terms) and savings accounts
- Other corporate M-Pesa products allow for:
 - Bulk payments
 - Payments of promotional fees
 - Payment of dividends



A broad mobile money ecosystem

Before and After innovation



Source: web.worldbank.org

Less friction and more incentives

As Trace Mayer said in an interview: “Some may even skip entire generations of currency, going directly from only using cash to using Bitcoin, missing out credit and debit cards altogether. In doing so they will also avoid the problems associated with card payments. Credit and debit cards are outdated; they were created before the internet whereas bitcoins have been designed with ecommerce in mind so they are much easier to use.”

As we’ve seen with M-Pesa, nearly 80,000 agents sprung out due to the existence of a profitability margin in exchanging M-Pesa into local currencies. Conventional shopkeepers were incented to add M-Pesa payments to attract a small profit (revenue sharing)

Since it only takes a cell phone with very limited capabilities to manifest the service, there is little friction in starting a service as an agent after receiving the “go” from Safaricom or other providers

Bitcoin=M-pesa on a planetary scale ?

- Until the infrastructure is there for global connectivity, mobile operators in developing countries could leverage the Bitcoin ecosystem and the inherent low transaction fees to provide a much needed service to those in their region. By creating a simple interface controlled by them, people from all over the world could send remittance funds via Bitcoin to their service, which they then handle with local agents to exchange in the local currencies.
- This would mean an additional profitability avenue for any mobile operator, with significantly lower costs, since the Bitcoin network is very lean and cost effective, while remaining safe and immediate
- The same avenue could easily propagate decentralized digital currencies as internet coverage develops further, with “*self-appointed*” agents profiting from converting BTC to local currencies in the same ways as [ABRA](#) or “local bitcoins” or the Mycelium wallet’s “*local trader*” functionality displays

Infrastructure By Leapfrogging



New tools + no infrastructure= ?

- Recent research at UC Berkley suggests digital currencies, and in specific “*Mobile Money*” used in Uganda, and the cost reduction recently brought to remittances, correlate with a major welfare increase, coupled by increases of household per capita consumption by 69 percent
- The interconnectivity produced by the internet and digitized communication, has presented a large number of new avenues for information acquisition, commerce and new avenues for trade, with fewer intermediaries
- We’ll try to take a deeper look at the potential that the technology behind digital currencies and specifically the technologies around distributed consensus may hold, as tools for building infrastructure where non exists
- If people and companies in developing countries are replacing conventional financial services with digital services that provide faster access, cost less and demand less physical presence, while bringing convenience, security and solve practical problems, who is to say that the same can’t happen in other areas?

A virtuous development for further development

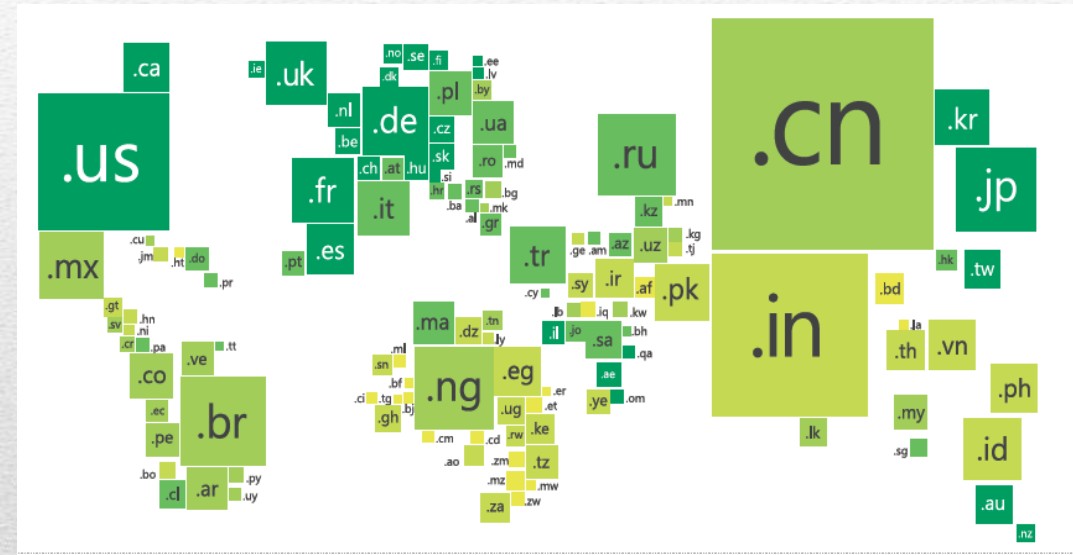


Billions about to be connected?

“For every person online, there are two who are not”, wrote Eric Schmidt of Google, and continued, “By the end of the decade, everyone on Earth will be connected.”

Current research Projections indicate that internet users will double by 2020 to about four billion worldwide, with large populations of users located in China, India and Africa

Firefox and Spreadtrum are making a \$25 Smartphone



Source: Microsoft

The next big barrier for companies like Google, Microsoft and Facebook appears to be bringing the internet to every developing country and citizen on the planet

A “new” Internet for the “newcomers”

The internet of this new generation of users will be quite different from the one we learned to use.

- In Thailand, more than 10,000 informal businesses are powered by Facebook with next to no physical presence
- Opening physical stores for the 700 million urban citizens of China can have prohibitive costs, so 90% of online retail is sold through online marketplaces. Alibaba’s Tmall has more than 180M customers and more than 150,000 merchants transacting digitally, providing a high profile “digital storefront” for major brands
- Social platforms in developing countries and China are about much more than chat-boxes, they are stores for products and services, with integrated payment solutions

Source: [The Emerging Global Web](#)

A changing market

“Alipay announced on its Weibo account that it processed nearly \$150 billion in mobile transactions in 2013... PayPal's mobile transaction volume was just \$27 billion in 2013...

Alipay says it has 300 million registered users and 100 million mobile users...

To give some context, consider that Amazon, which has its own payments business, has 224 million registered users.”

Source: [Business Insider](#)

The WeChat Platform

- ▶ WeChat: 806m monthly users
- ▶ 2014: Customer acquisition via “red packets” promotion
- ▶ 2016: 420m users sent 32b P2P payments over six days
 - ▶ *PayPal: 4.9b TXNs in 2015*
- ▶ Cultural meme & social communication
 - ▶ 60m users sending per day

Another exciting and (quite frankly, virally) expanding platform mainly used in China, is WeChat, which started as a messaging platform but quickly integrated a bespoke payment system to develop its internal ecosystem of apps and functions.

Source: <https://twitter.com/jasuja/status/790614765915648000>

More here : <https://techcrunch.com/2016/03/17/messaging-app-wechat-is-becoming-a-mobile-payment-giant-in-china/>

Wires - not required

- While in the developed world, innovation and development usually follow certain known paths mentioned in the previous lectures - we will elaborate on this further in the course, digital innovation has allowed developing countries to essentially “*leapfrog*” some of these stages
- One of the most common, as we see in Africa, India and South East Asia, is wired communications. By jumping directly into the wireless phase of communication development, habitats of these areas can adapt with far less cost and infrastructure demands to what the developed world slowly developed over the course of decades
- The same could be argued for a number of conventional infrastructure that people in the Western world consider a given. Schools and universities appear to be moving in that direction as well, and so are a number of civil services and support functions

Thought Exercise: Attestation

- Attestation for instance, the fact of providing proof of identity can be wholly digitized with systems akin to what Bitcoin is using, asymmetric cryptography. Imagine a village that has no street addresses, no significant central authority to issue certificates, no notaries to verify the legality of contracts or agreements, or even ownership titles of real estate. Could they be using [Blockstack](#), [Keybase](#), [Uport](#) or any other key based identity solution ?
- Instead of performing the conventional KYC policies that financial services need to operate, systems of digital crowd-sourced identity management could exist for rural communities to attest that a certain member of the community is who he claims he is, and the more villagers attest to this fact, the more credible his own online identity is when digitally signing documents
- The documents or contracts, need to exist only online via extended protocols like (e.g.) Ethereum or Rootstock, and could be transparent and easily verifiable by the authorities



Currency is only the first 'app'

The invention of the Blockchain might allow some or all of these systems to be digitally decentralized over time to some degree:

- | | | | |
|--|---|--|---|
| <ul style="list-style-type: none"> • I. Financial Instruments, Records and Models • Currency • Private equities • Public equities • Bonds • Derivatives (futures, forwards, swaps, options and more complex variations) • Voting rights associated with any of the above | <ul style="list-style-type: none"> • Commodities • Spending records • Trading records • Mortgage / loan records • Servicing records • Crowd-funding • Micro-finance • Micro-charity • II. Public Records • Land titles • Vehicle registries | <ul style="list-style-type: none"> • Business license • Business incorporation / dissolution records • Business ownership records • Regulatory records • Criminal records • Passports • Birth certificates • Death certificates • Voter IDs • Voting | <ul style="list-style-type: none"> • Health / Safety Inspections • Building permits • Gun permits • Forensic evidence • Court records • Voting records • Non-profit records • Government / non-profit accounting / transparency |
|--|---|--|---|

Currency is only the first 'app'

• III. Private Records

- Contracts
- Signatures
- Wills
- Trusts
- Escrows
- GPS trails (personal)

IV. Other Semi-Public Records

- Degree
- Certifications

• Learning Outcomes

- Grades
- HR records (salary, performance reviews, accomplishment)
- Medical records
- Accounting records
- Business transaction records
- Genome data
- GPS trails (institutional)
- Delivery records

• Arbitration

V. Physical Asset Keys

- Home / apartment keys
- Vacation home / timeshare keys
- Hotel room keys
- Car keys
- Rental car keys
- Leased cars keys
- Locker keys
- Safety deposit box keys

- Package delivery (split key between delivery firm and receiver)

- Betting records
- Fantasy sports records

Currency is only the first 'app'

VI. Intangibles

- Coupons
- Vouchers
- Reservations (restaurants, hotels, queues, etc)
- Movie tickets
- Patents
- Copyrights
- Trademarks
- Software licenses
- Videogame licenses
- Music/movie/book licenses (DRM)
- Domain names
- Online identities
- Proof of authorship / Proof of prior art

Source: [Ledra Capital crowd-sourced list](#). Some ideas are more exotic than others, but certainly some of these will come to fruition.

**What would
You try to do
if you didn't
know
what was
impossible?**



The young do not know enough to be prudent
and therefore they attempt the IMPOSSIBLE...

and achieve it generation after generation

Pearl S Buck

Source: impossiblehq.com

Digital Currencies and the Developing World - A preview of DFIN-535 (MSc)

A preview of DFIN-535 (MSc)

There's much more to cover with regards to digital currency and the developing world – for instance, how the under-development of financial systems hinders growth, and much more:

- **The Developing World** – How under-development hinders growth, world patterns of poverty/growth, weak institutional system hypothesis, demographic trends
- **Pathway to Development** – Consumer products and key differences in marketing and distribution, pathway from developing to developed country
- **Alternative Payment Mechanisms** – Financial infrastructure analysis, alternative payment mechanisms (e.g. M-Pesa), implications for digital currencies, role of decentralized systems
- **Microfinance and it's impact** – We examine the many facets of microfinance as a development tool opportunities and opportunities that are available via decentralized systems

All of the above are covered by DFIN-535 Digital Currencies and The Developing World from the MSc.

Conclusions

Conclusions

- The large percentage of the global adult population does not have access to conventional finance infrastructure and services.
- M-Pesa is one example of an extremely successful private initiative to leverage a digital communication platform (mobile phones) into a financial transaction system in a country with a limited financial services sector. It is a great example of 'leapfrogging'.
- The increasing prevalence of internet connectivity will bring many more newcomers to the internet that will want to interact with the global market.
- For many of these newcomers, conventional local infrastructure will be lacking and if newer, easier, digital solutions emerge, they might be able to 'leapfrog' a generation forward in a similar manner.

Further Reading

Further Reading

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- The company behind the \$25 Mozilla Firefox OS smartphone
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- M-Pesa: How Kenya took the lead in mobile money
<http://www.mobiletransaction.org/m-pesa-kenya-the-lead-in-mobile-money/>
- The Economics of M-PESA
<http://www.mit.edu/~tavneet/M-Pesa.pdf>

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- Bitcoin growing in Africa
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Questions?



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