

Blockchain Technology: Challenges and Opportunities

Regional Payments Week 2015

The World Bank, BIS and CEMLA

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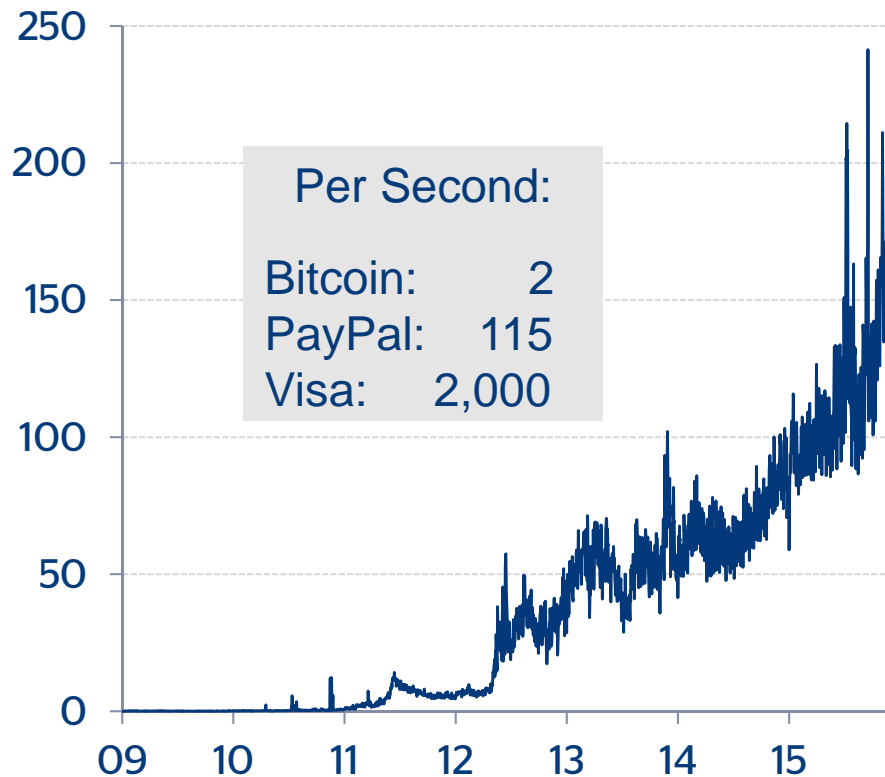
Bitcoin and Blockchain

In the beginning there was Bitcoin

Bitcoin, the first decentralized cryptocurrency, peer-to-peer payment network, has gained popularity

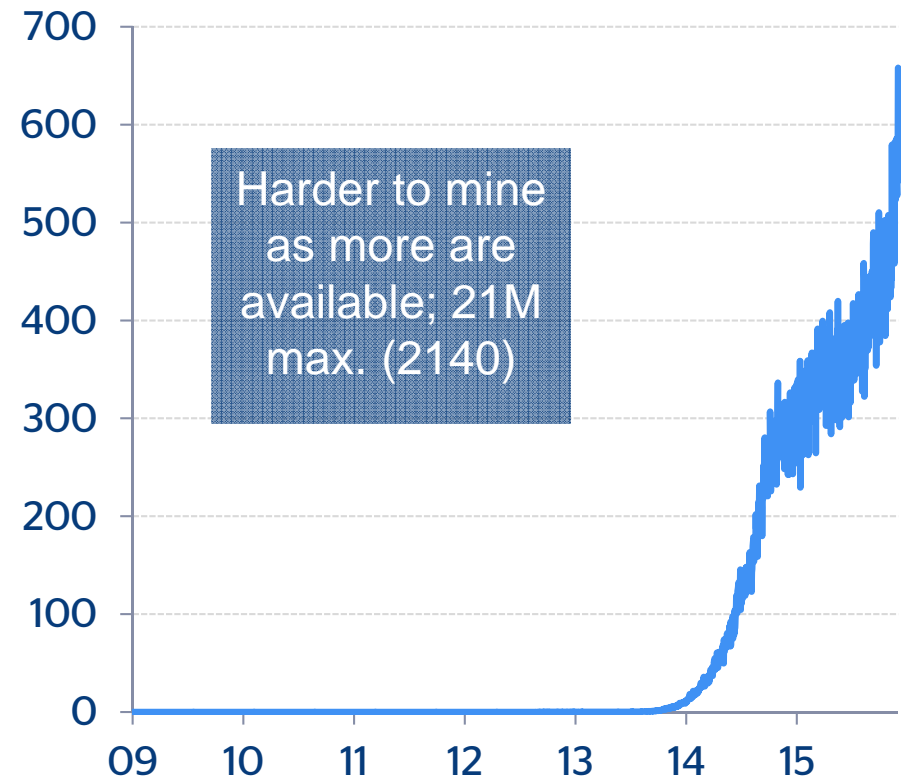
Transaction per Day

Thousands



Hash Rate

Million GH/s

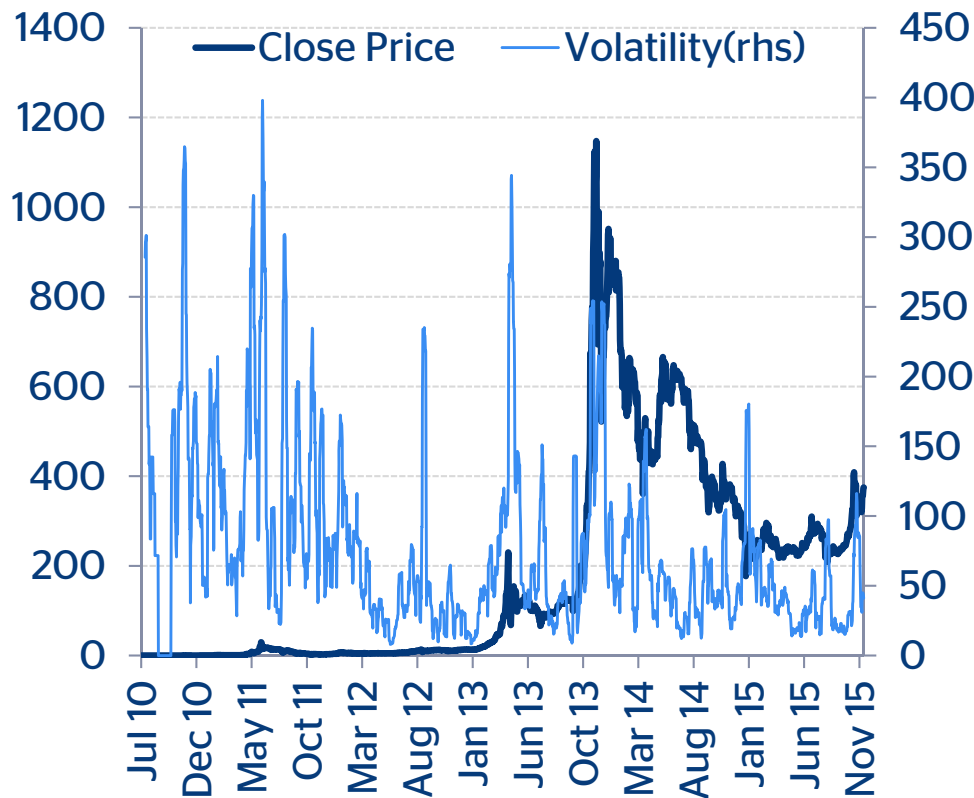


Definitions and predictions as volatile as Bitcoin itself

However, there is a heated debate on whether it can be considered “money”

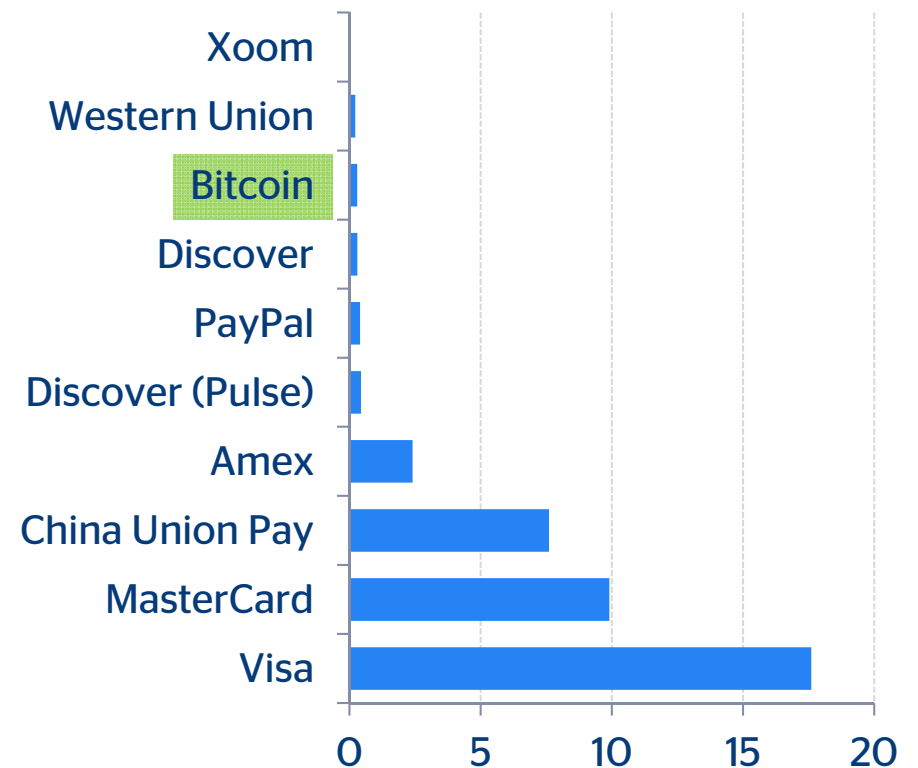
Daily Close Price and Volatility

USD and %



Transaction Volume

US\$bn, daily average



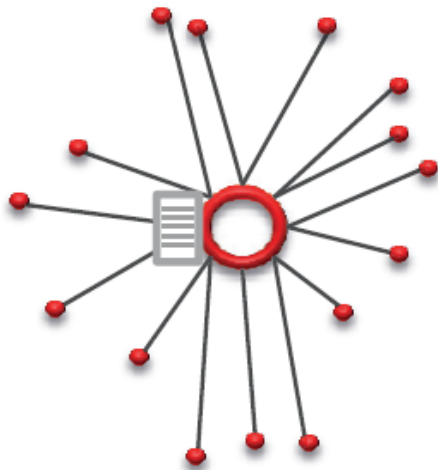
What matters the most is Blockchain technology

The main contribution is Bitcoin's technological backbone: Blockchain technology; a distributed ledger of verified transactions of a particular unit

Blockchain:

- Decentralized and immutable ledger; no central repository or single administrator
- Holds and reports the numbers of every transaction
- Available to everybody, so all transactions are public

Centralized



Decentralized (hubs)



Distributed

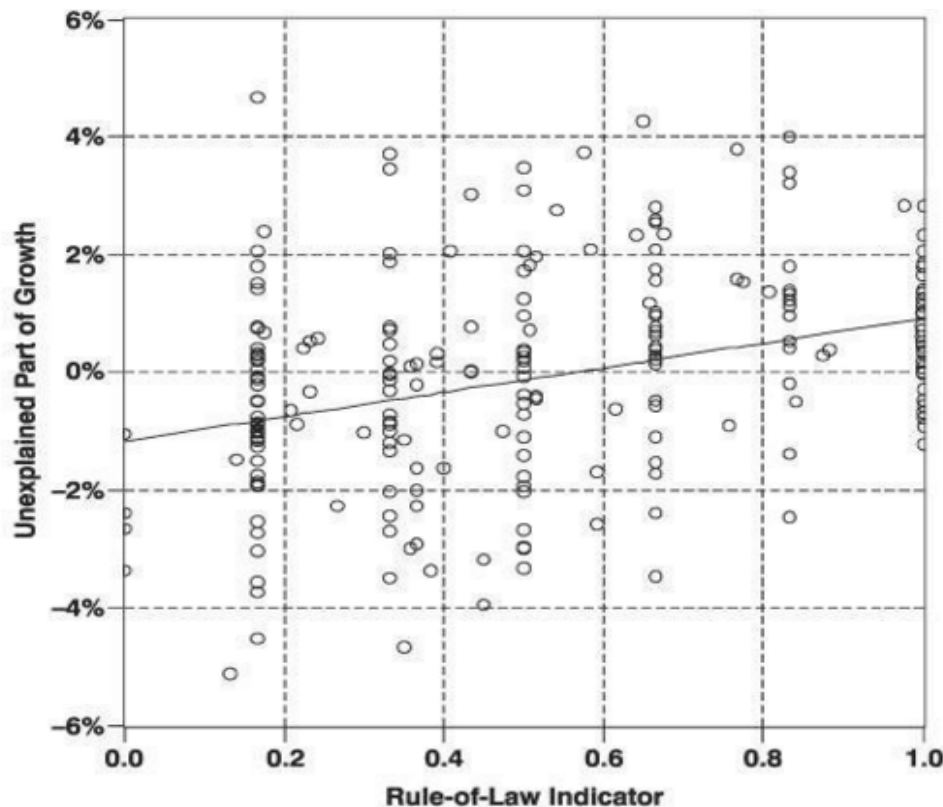


Blockchain technology can effectively build trust

Property rights and prosperity are inextricably linked

Rule of Law and Economic Growth

% and Index



Source: Barro & Sala-i-Martin

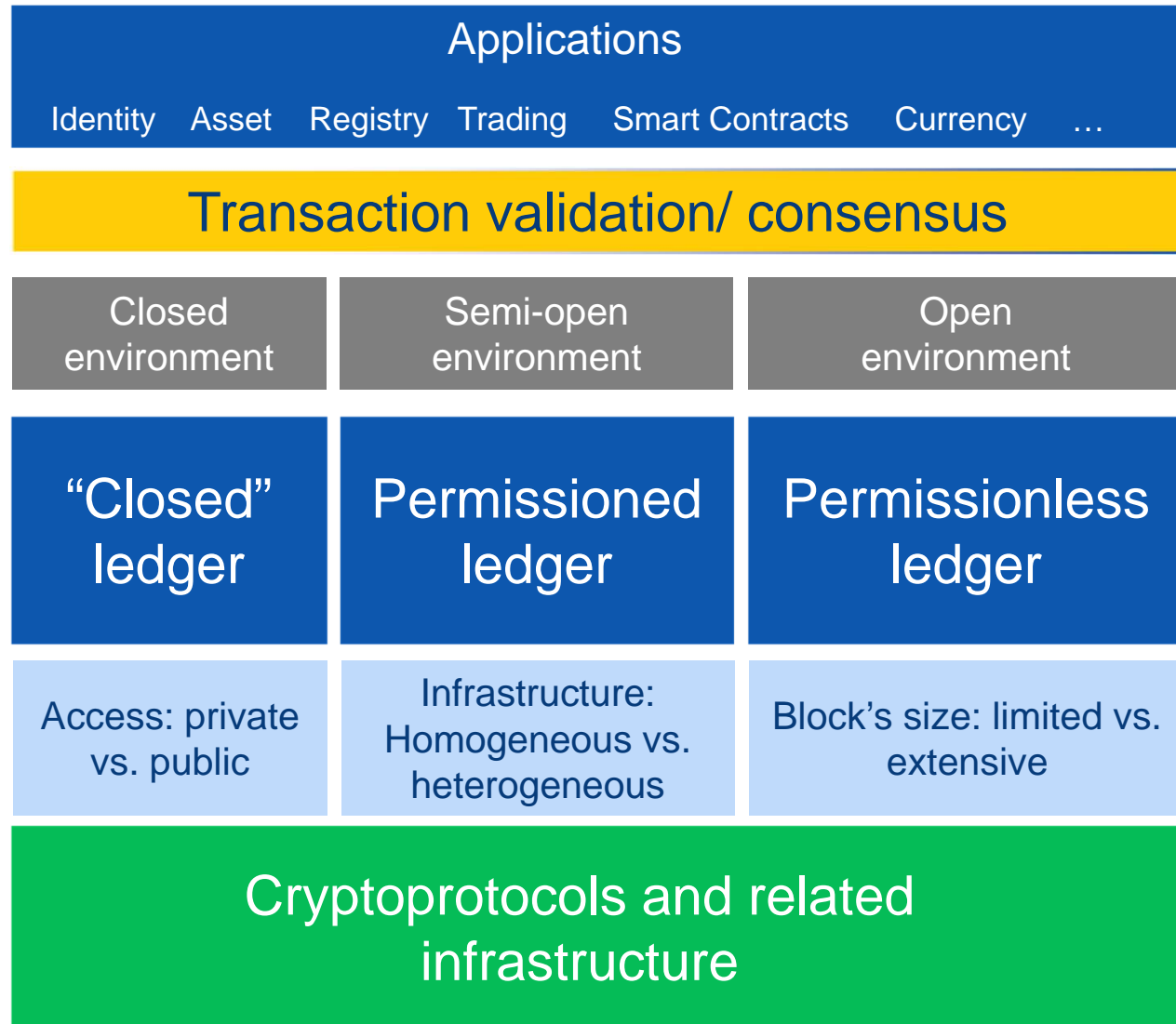
“Virtually every commercial transaction has within itself an element of trust”
Arrow

Trust facilitates transactions and lowers monitoring & screening costs
A broader and stronger protection of property rights enhances resource allocation, which translates into greater wealth creation

- Are you who you say you are?
- Do you own what you claim to own?
- Will you deliver on your commitment?

The essentials of Blockchain

- Transactions are added to the ledger as new blocks on a chain
- “Copies” are replicated by each transaction agent or “validator”
- Transactions’ validators operate through consensus mechanism = self-policing, verifiable, trustable
- Validation resilient to malicious attacks
- System is consistent and failure tolerant



Great interest in exploring its capabilities

2015: Fast and Furious

February

March

April

September



Coinbase announces first licensed Bitcoin exchange



Digital Asset Holdings plans to use the blockchain for syndicated loans, Treasury repos, and settlement. Acquires Hyperledger



Circle raises \$50 million led by Goldman Sachs and IDG



Visa, Citi et al. invest \$30 million in **Chain.com**



BBVA and other banks join the **Distributed Ledger Group**, formed by **R3 CEV**, to jointly explore architecture, identity and security, and regulatory/legal frameworks



Bank of England questions whether central banks should issue digital currencies

New players and uses continue emerging

Financial and Non Financial use cases

Cloud Storage



Filecoin



Digital Identity



ONENAME

Internet of things



FILAMENT



Social networks



synereo



twister

Supply chain

thingchain

Digital asset issuance

funderbeam



ChromaWay

Asset Registries/ Anti counterfeiting



everledger



factom

Private chains



hyperledger

Analytics

COINALYTICS



BLOCKVERIFY

VERISART

Smart contracts



ethereum

Custody

xapo

Cross Border



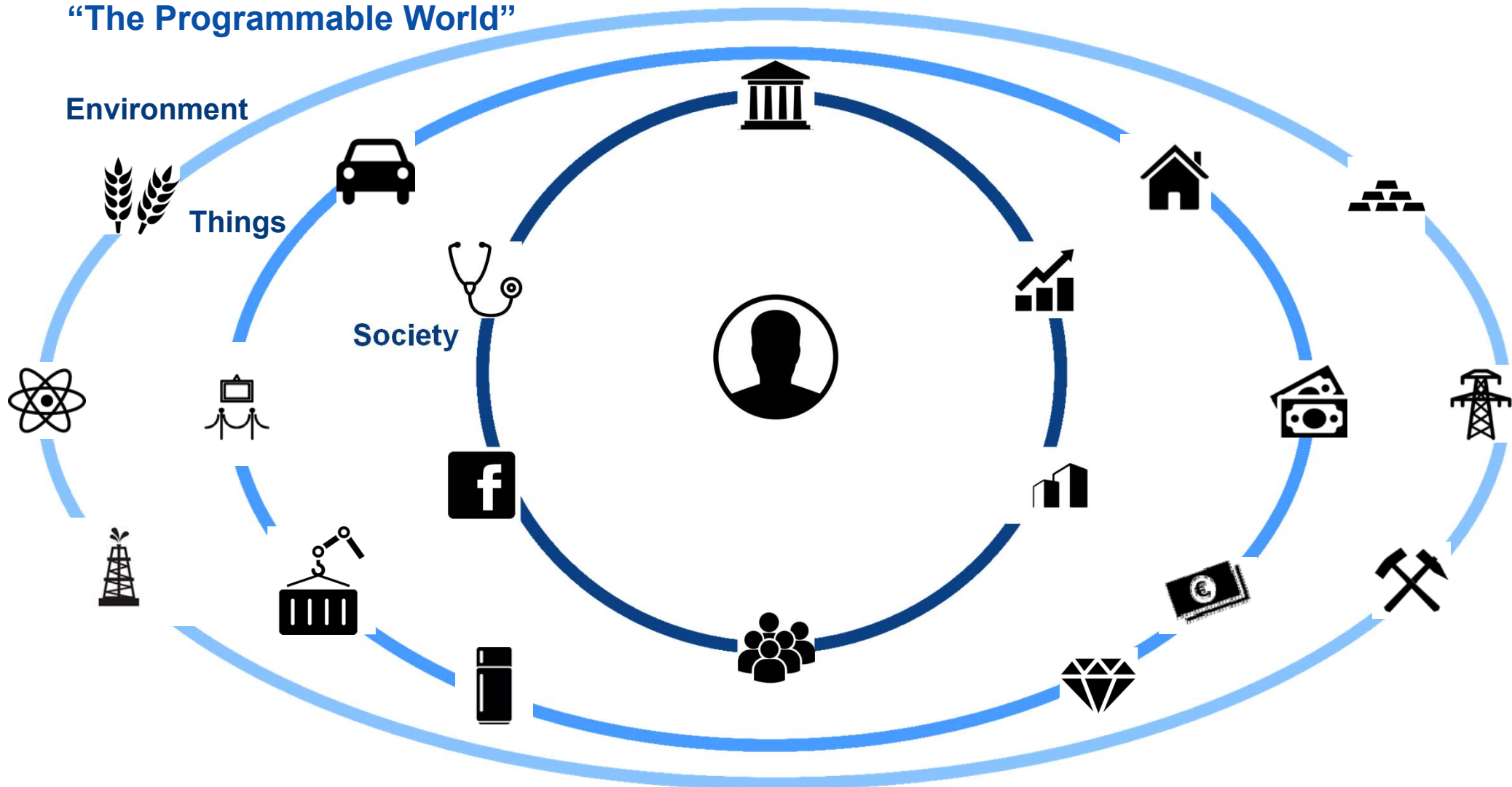
CIRCLE

MONEGRAPH



Endless possibilities in the age of Internet of Things

“The Programmable World”



10% of world GDP will be stored on blockchain by 2027

Will a thousand chains blossom?

Intangibles: Coupons; Vouchers; Reservations; 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

Private Records: Contracts; Signatures; Wills; Trusts; Escrows; GPS trails

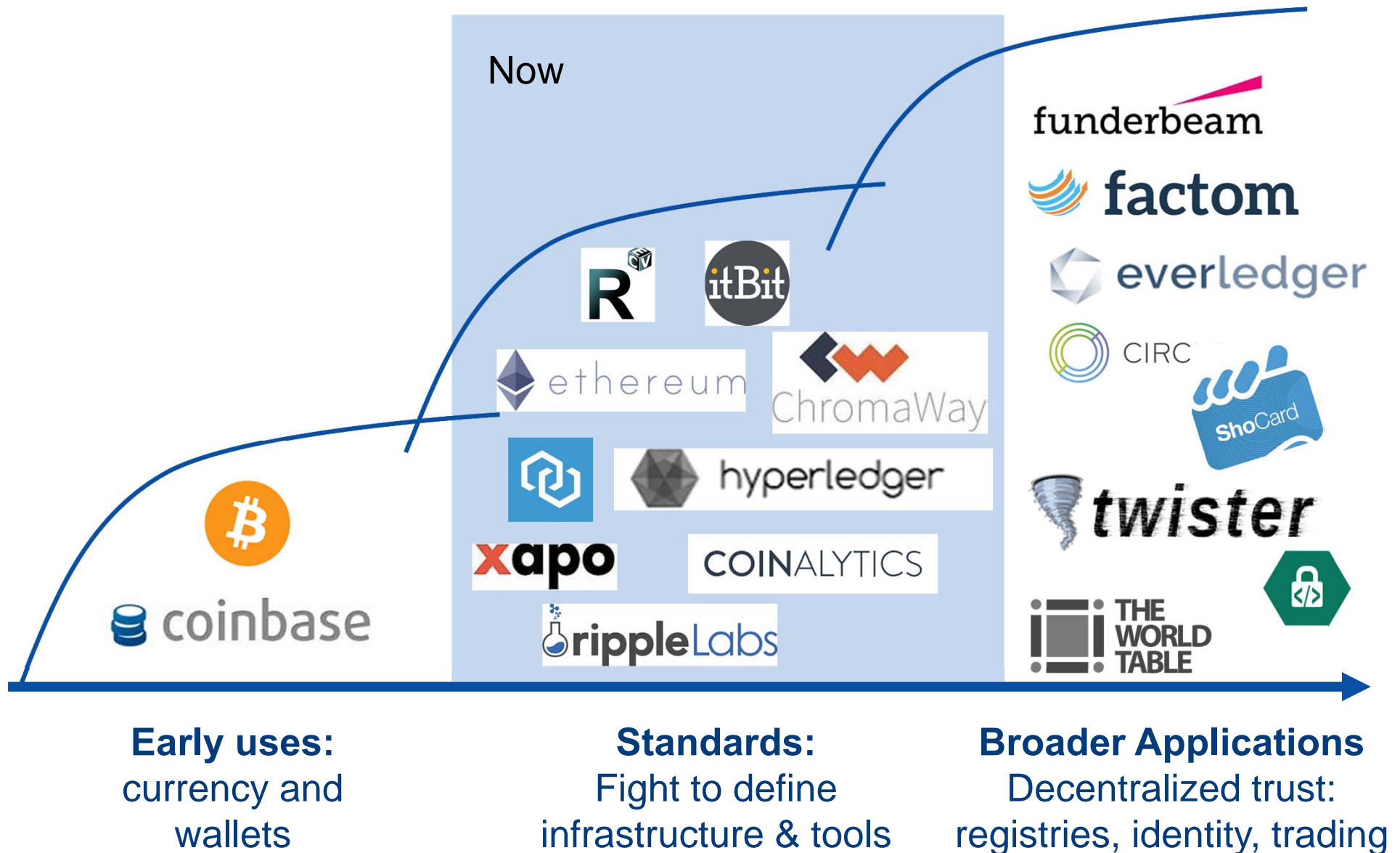
Semi-public: Degrees; Certifications; Learning outcomes; Grades; HR records; Medical; Accounting; Business transaction; Genome data; GPS trails (institutional); Delivery; Arbitration

Other: Temperature; Sports; Sim Cards;; Spam control; Nuclear launch codes!

Physical Assets: Home/ Apartment/ Vacation home/timeshare keys; Hotel room keys Car keys; Rental car keys; Locker keys Safety deposit box keys; Package delivery; Betting; Fantasy sports

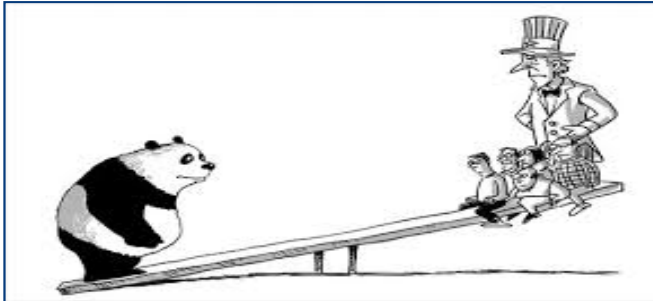
Public Records: Land titles; Vehicle registries; Business license; Business incorporation / dissolution; Business ownership; Regulatory records; Criminal records; Passports; Birth certificates; Death certificates; Voter IDs; Voting/elections; Health/ Safety Inspections; Building permits; Gun permits; Forensic evidence; Court records; Voting records; Non-profit records; Government/ non-profit accounting/transparency

More to come in the years ahead



Implications for Banks

Banks are adapting to a new environment



Macroeconomic Conditions

- Global rebalancing
- USD appreciation
- Drop in commodity prices
- Muted inflation
- Lower trend-growth
- Divergent monetary policies



Business Environment

- Pressures on margins
- New regulations
- Commoditization
- Utility model
- Disruption
- Consumer preferences



Structural Trends

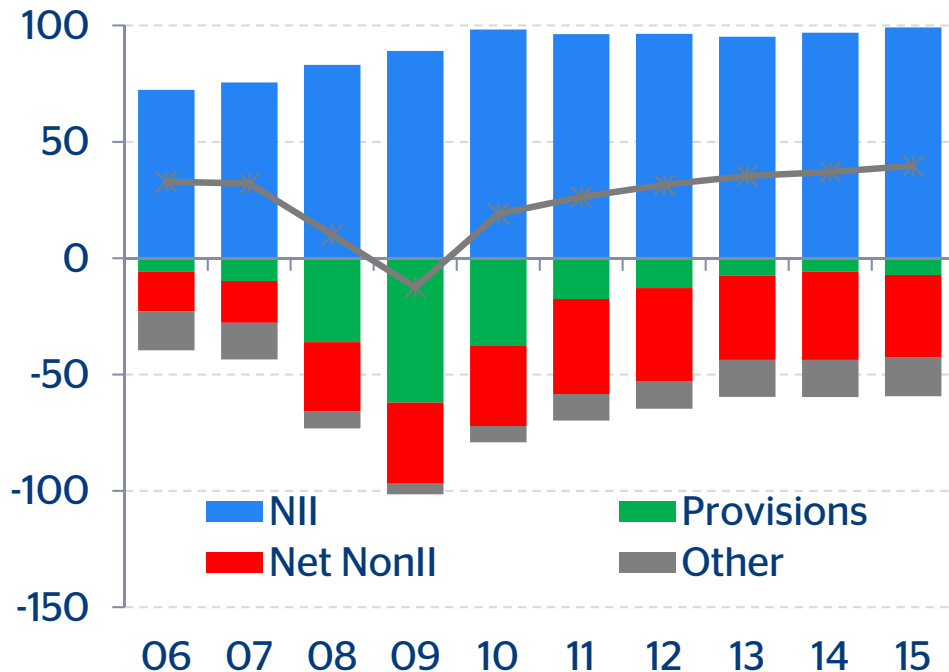
- Digital revolution
- Productivity and K/L
- Demographic changes
- Climate change
- Sustainability
- Emerging risks

Banks face significant challenges

Shrinking provisions helped offset margin pressures. However, profitability still remains below pre-crisis levels

U.S. Banks: Income Statement

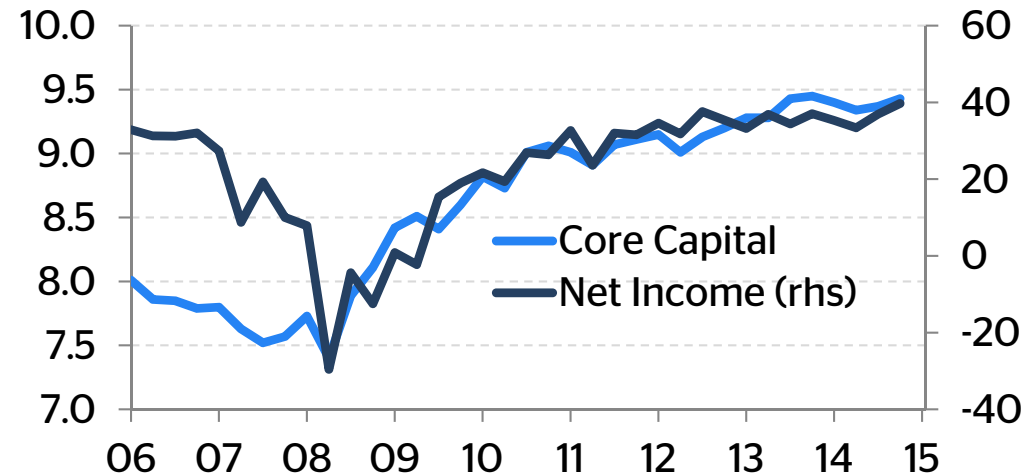
US\$ Billions, Same Quarter, Last Available



Source: BBVA Research, FDIC & Haver

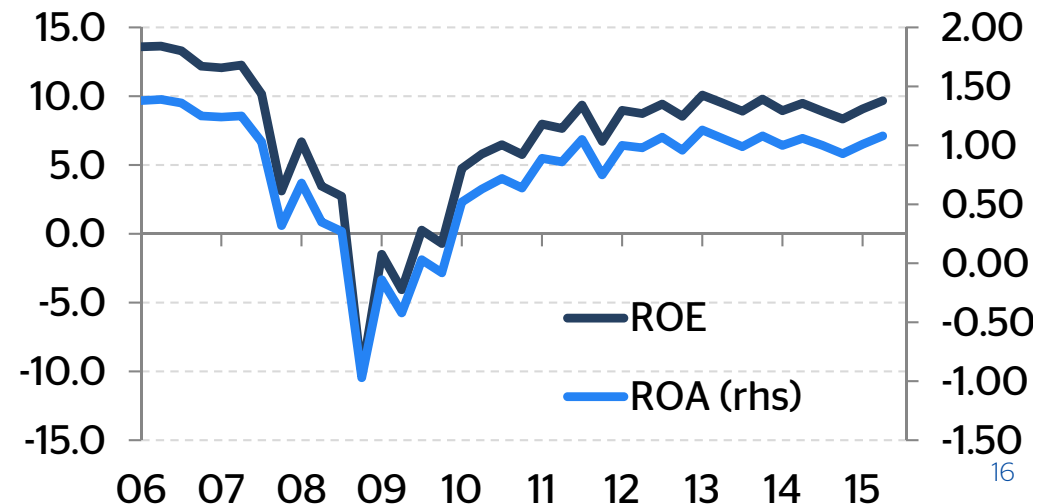
U.S. Banks: Profitability and Capital

% & US\$bn per quarter



U.S. Banks: Profitability

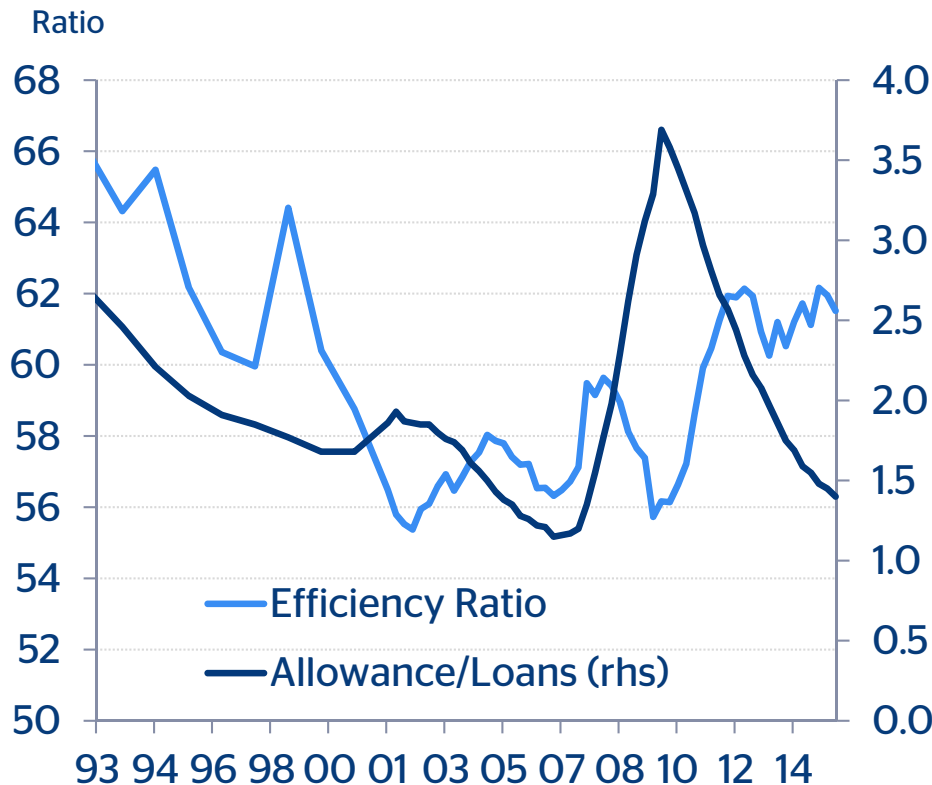
%



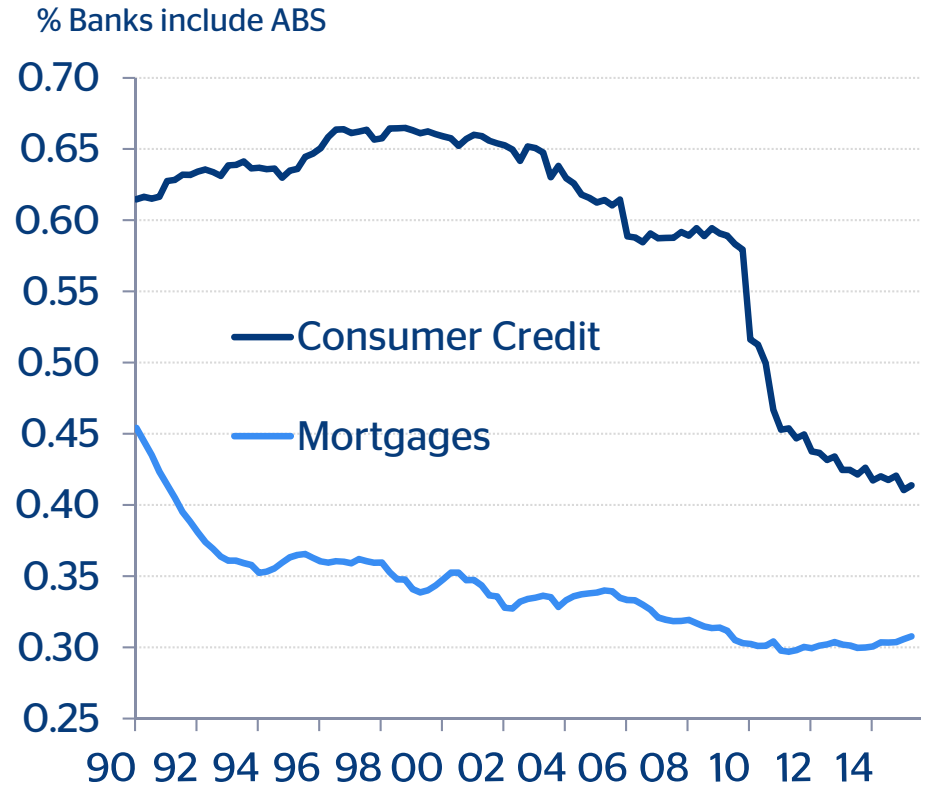
Banks face significant challenges

Banks need to develop new sources of profitability while regaining trust and maintaining stability

U.S. Banks Efficiency and Allowances



U.S. Chartered Banks Share of Total



Difficulty attracting top talent

Banks face challenges in attracting young talent. Imperative to offer the ability to innovate and a sense of purpose

Top Career Goals Reported by Generation

	Millennials	Gen X	Baby Boomers
Make a positive impact on my organization			
Help solve social and/or environmental challenges			
Work with a diverse group of people			
Work for an organization among the best in my industry			
Do work I am passionate about			
Manage my work/life balance			

Source: IBM

Top Companies Preferred by Millennials

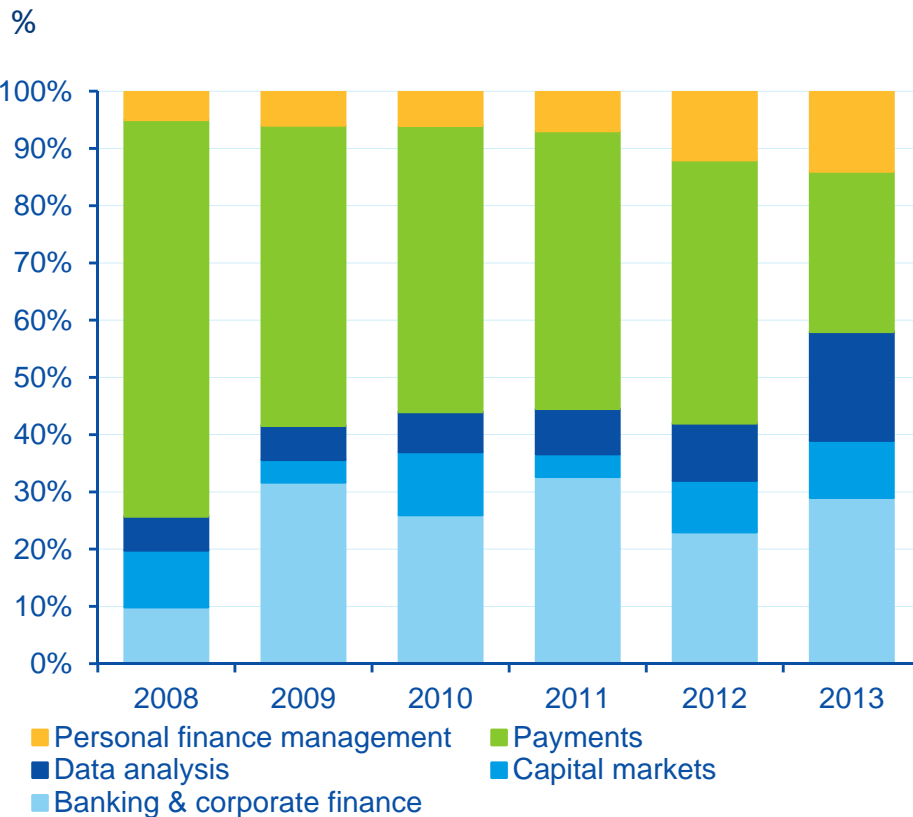
1.		Information Technology
2.		Entertainment
3.		Healthcare
4.		Electronics
5.		Government

Source: National Society of High School Scholars

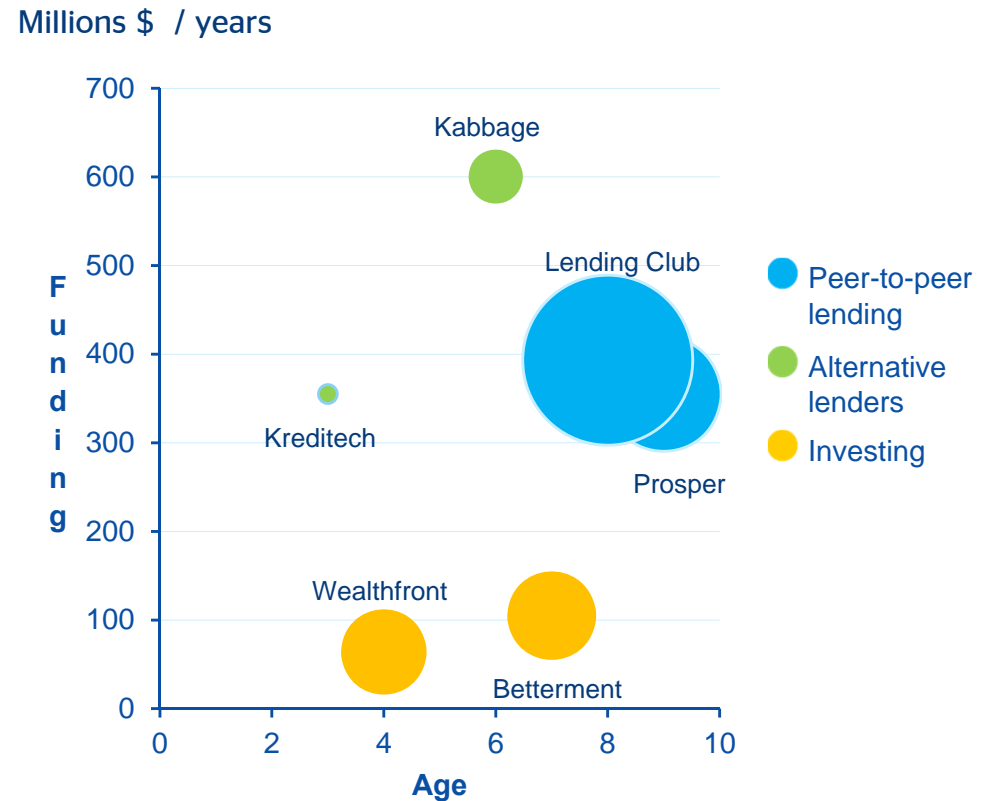
Disruptors expand their nibbling

Payments dominate Fin Tech space but personal finance startups gain in share and are strong in funding

Fin Tech by Area



Fin Tech Startups: Age, Funding and AUM*



The digital revolution will not wait

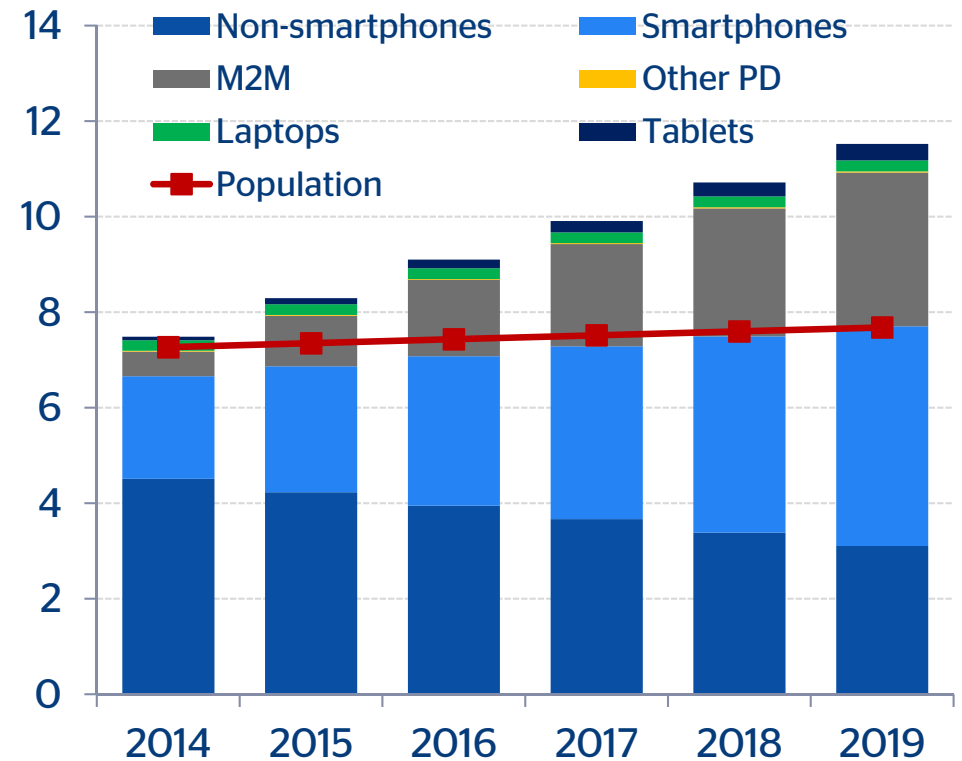
Strong growth of mobile technologies and fast adoption

Mobile Technologies



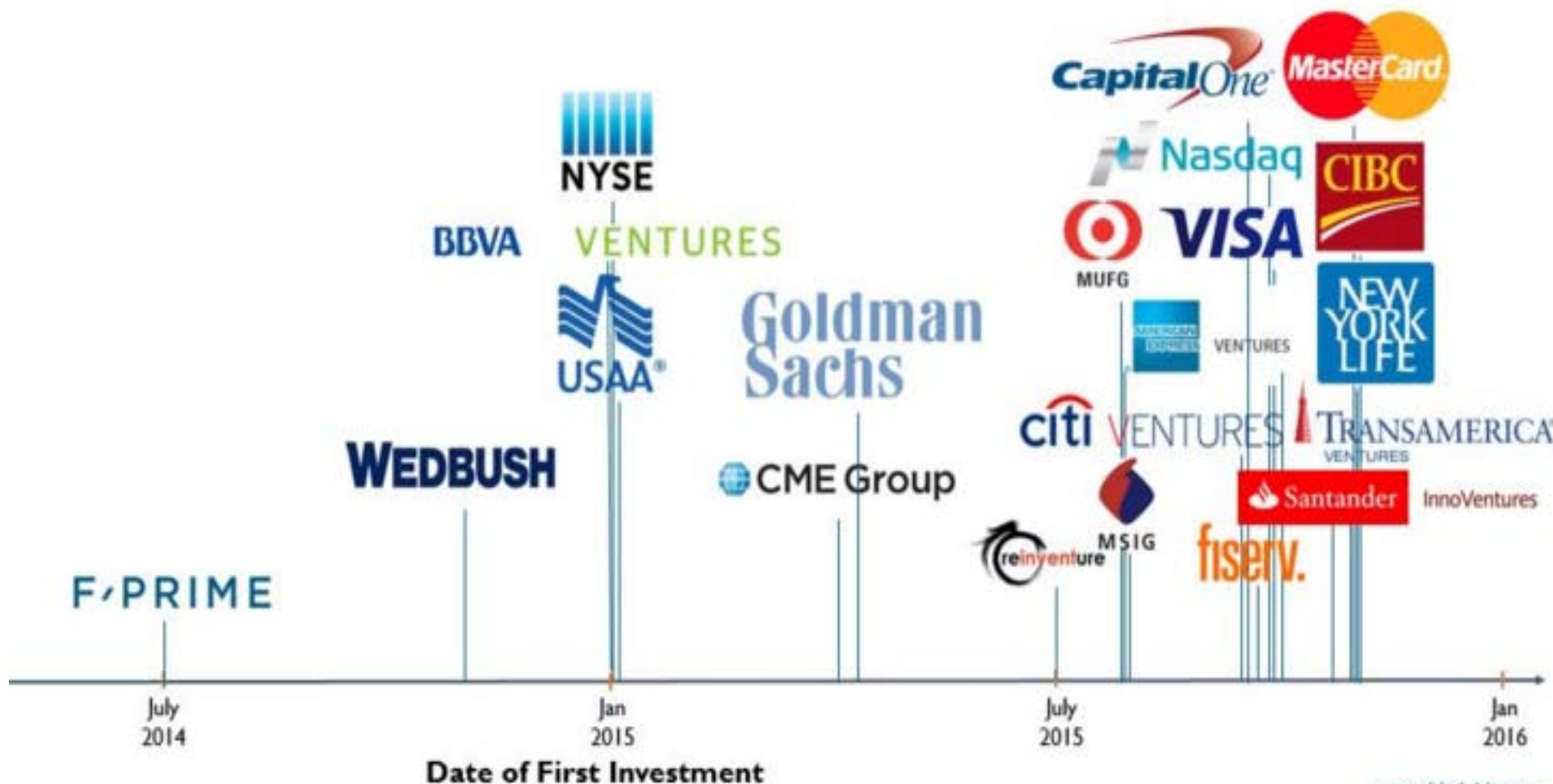
Mobile Devices and World Population

Billions



Who wants to be an spectator?

The march of giants into Bitcoin and Blockchain startups

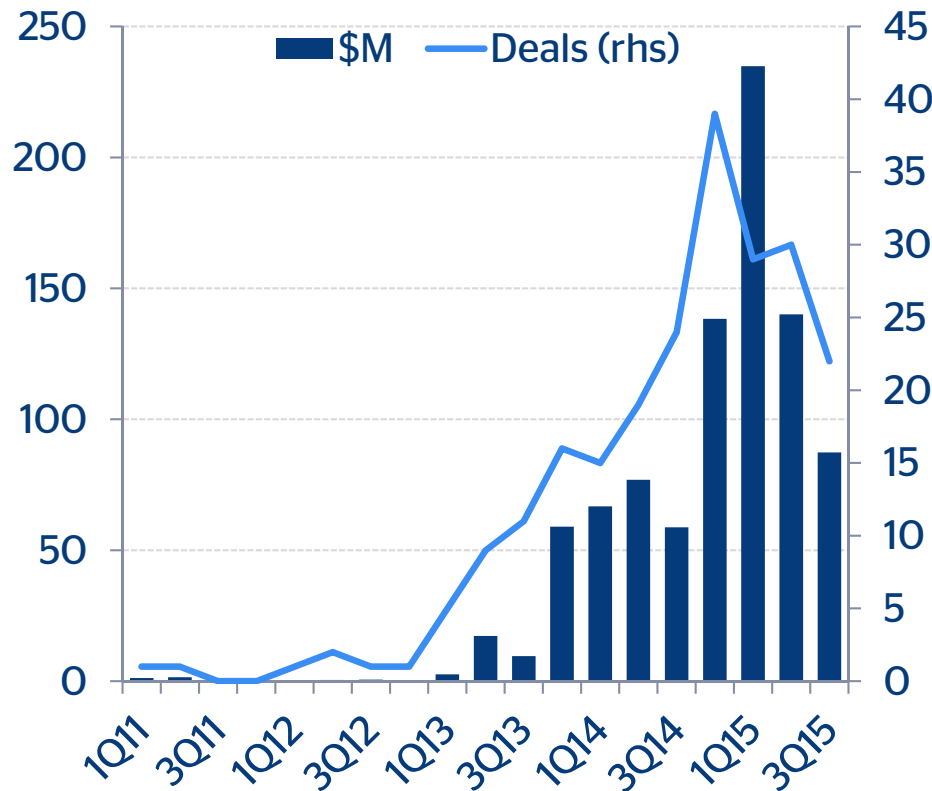


Not short for money

Around \$500bn in 2015, expanding into later rounds

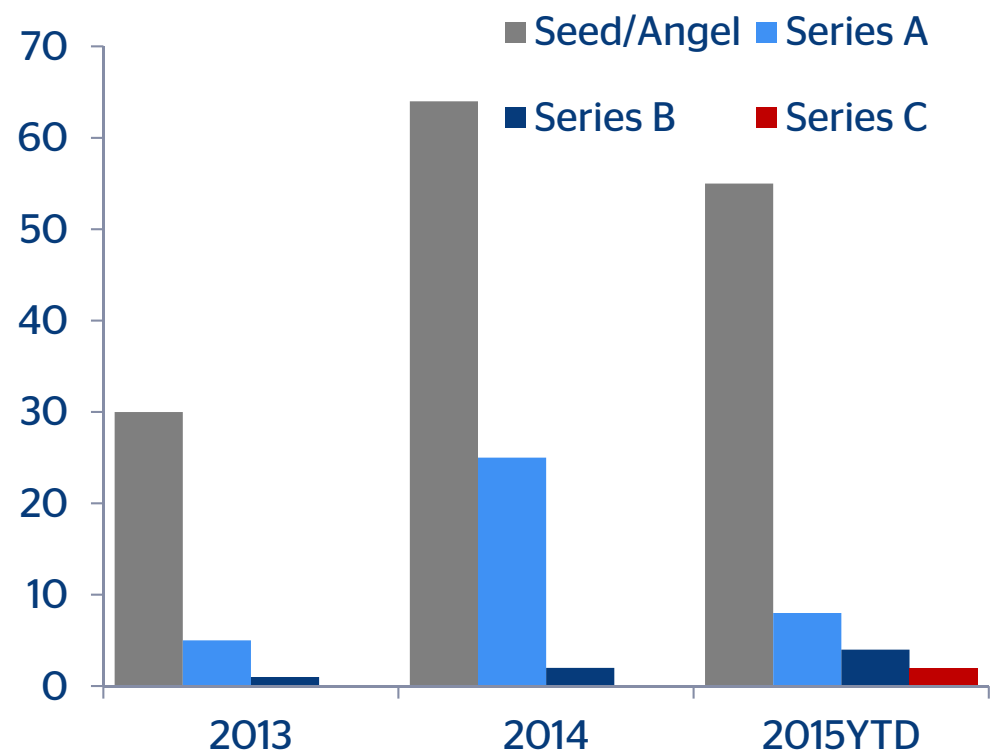
Bitcoin/Blockchain Financing Activity

US\$M and Number



Bitcoin/Blockchain Deal Trend by Round

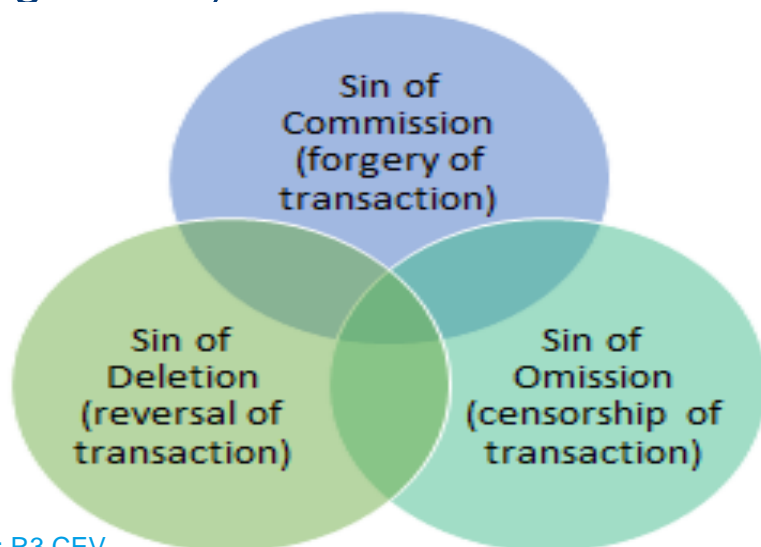
US\$M



An opportunity to boost efficiency and profitability

Major problems solved

- Overhaul inefficient legacy IT systems
- Reduce forgery (i.e. identity theft, payment fraud)
- Censorship of transaction (i.e. posts deleted, services taken down)
- Reversal of transaction (i.e. chargebacks)

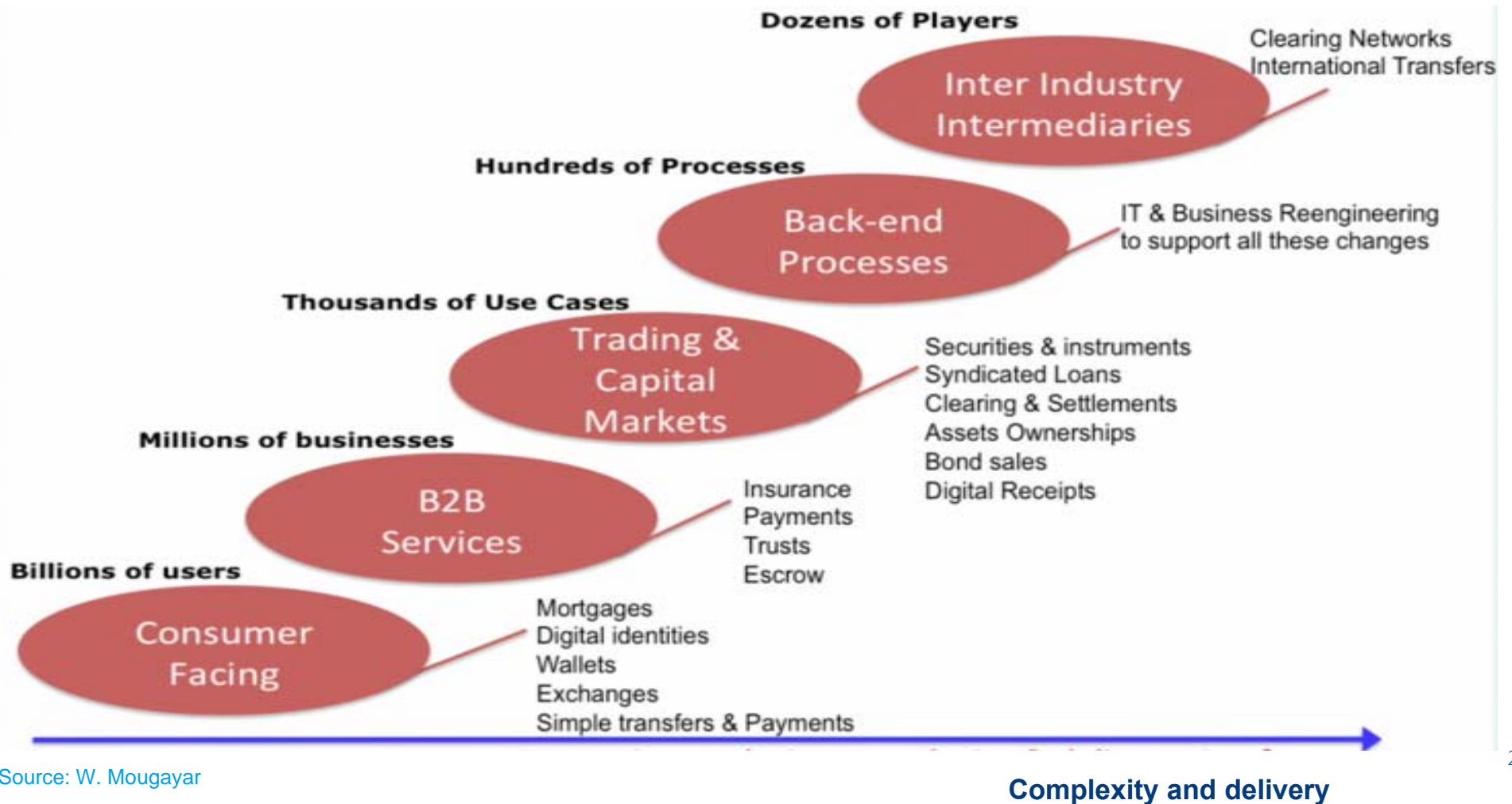


Major gains ahead

- More effective capital allocation
- Greater efficiency
- “Distributed ledger technology could reduce banks’ infrastructure costs attributable to cross-border payments, securities trading and regulatory compliance by between \$15-20 billion per annum by 2022” *
- Reduce/eliminate credit and liquidity risk

Vast opportunities across the value-chain

Blockchain in Financial Services



From payments to programmable money to smart property to autonomous firms

Payments:

10min vs. 1-3 days;
24/7 bypass
complex back-
office process

Remittances

Instant FX
conversion; no risks

Programmable Money

Autonomous, self-executing.
Software vs. customer; property
transfers, loan repayments,
crowdfunding, donations, multi-
signature accounts, trusts, dividend
payments

Micro- payments

Free, instant and
w/o bank account

Internal payments

Avoid burdensome
internal process

Smart Property

“Colored coins”; adds information:
stocks, bonds, houses, cars &
commodities. Paperless, no
maintenance, no central authority
(custodial bank); insurance/leases;
P2P lending and settlement

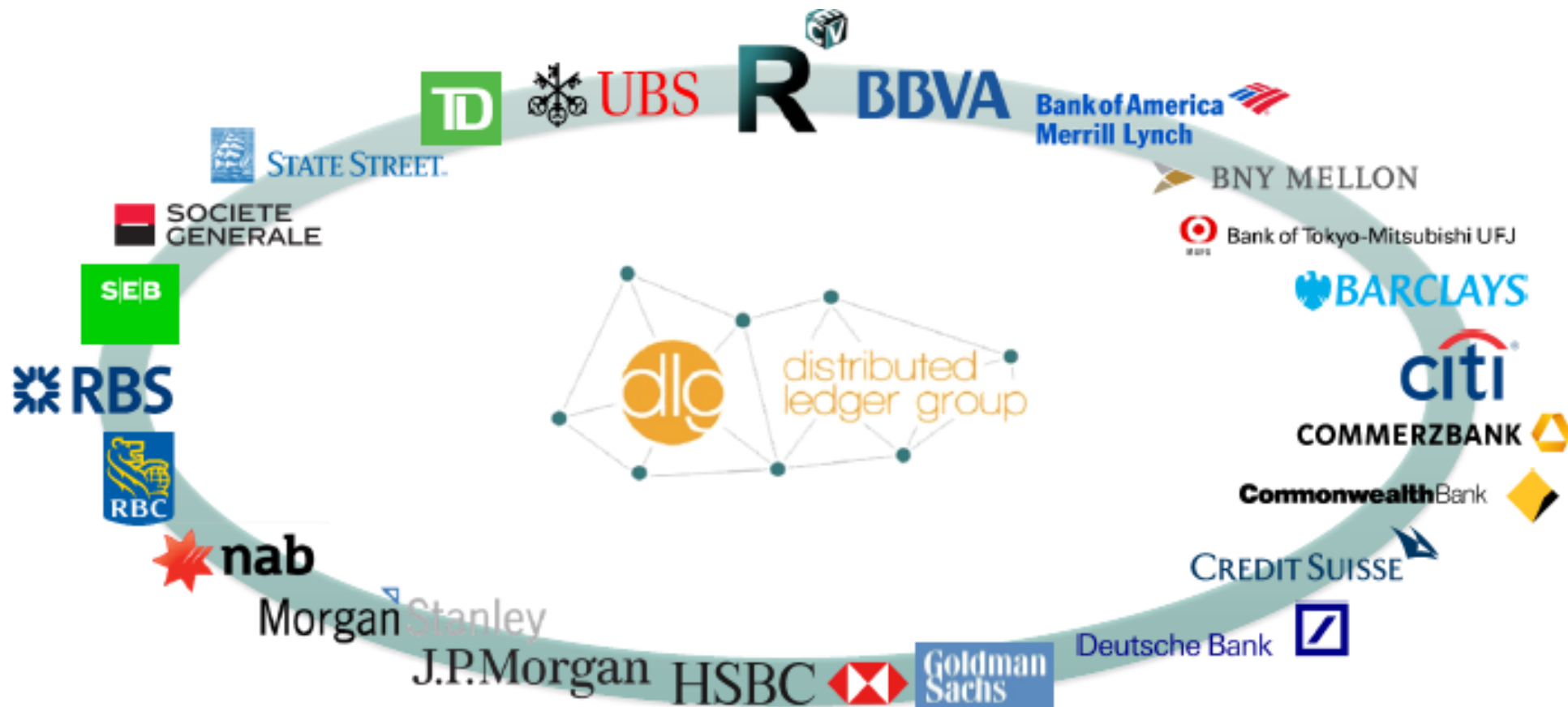
P2P Data storage

Audit, KYC, info
across network

Autonomous Firms?

**New technologies embraced with lags
Are our institutions/legal framework
equipped for this transformation?**

Industry alliances to promote interbank collaboration



- Alliance of global banks to build a “financial grade” trust network for use cases
- Workstreams on 1) architecture; 2) identity and regulation and 3) regulatory and legal frameworks

Increased activity on the regulatory side



"[] the distributed ledger technology [] may have considerable promise. [] This raises the question of whether central banks should themselves make use of such technology to issue digital currencies."

One Bank Research Agenda, 2015



NYDFS issues regulatory framework for digital currency companies

June 2015



Imagine that the Fed [] makes available an open-source Bitocin-like protocol [] called Fedcoin"

David Andolfatto, Federal Reserve of St Louis, February 2015



ESMA call for evidence on virtual currency or distributed ledger technology

April 2015



Central banks could consider – as a potential policy response to these developments – investigating the potential uses of distributed ledgers in payment systems or other types of FMIs.

BIS, November 2015



"although VCS can have positive aspects in terms of financial innovation and the provision of additional payment alternatives for consumers, it is clear that they also entail risks"

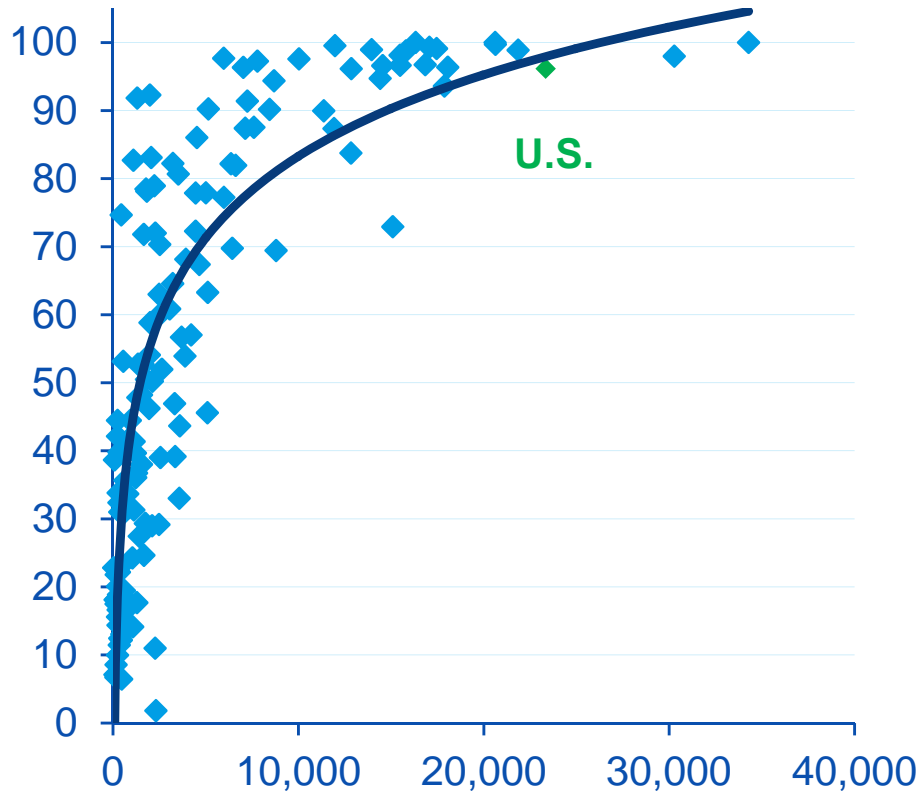
ECB, February 2015

Financial Inclusion: Opportunities

Despite ranking highly at the aggregate level, U.S. financial inclusion remains largely heterogeneous

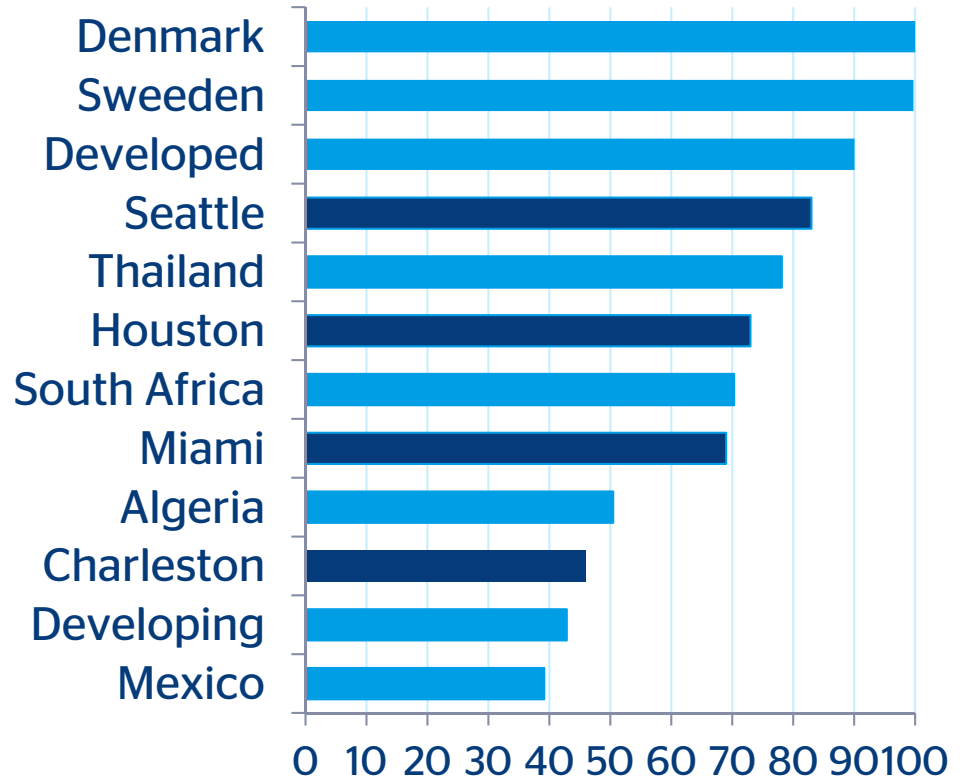
World Account Ownership & GNI per Capita

Share %, Current US\$



Bank Account Ownership

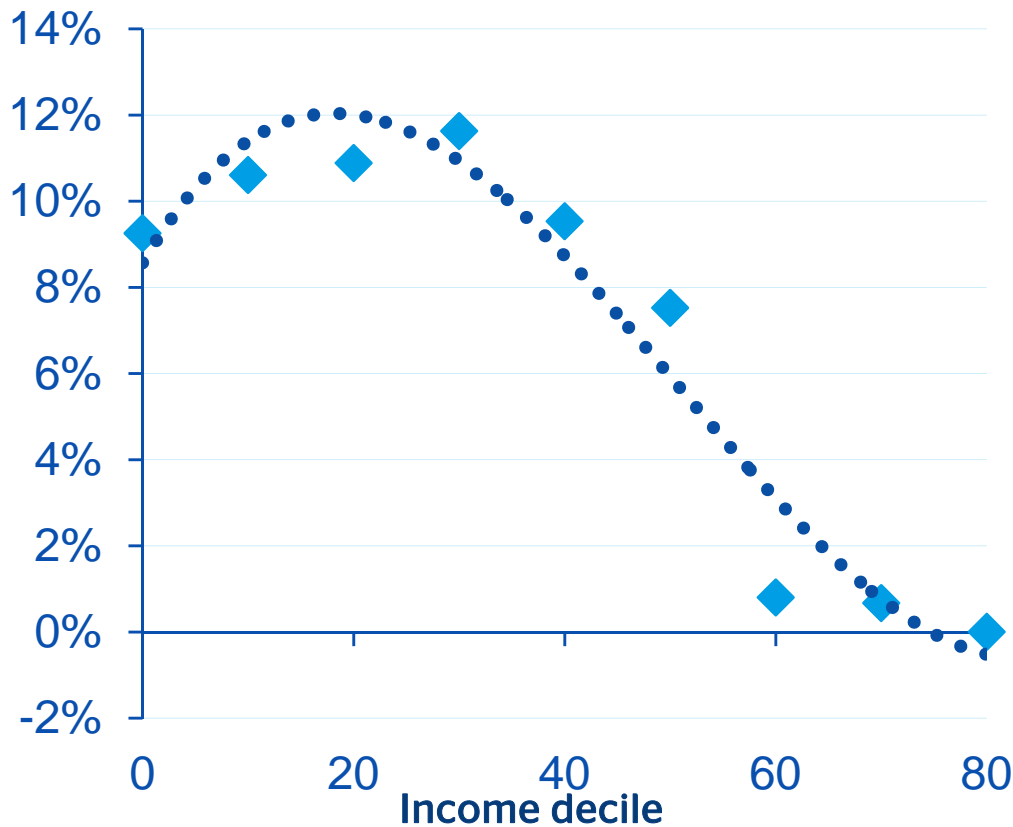
% of households; selected countries and U.S. MSAs



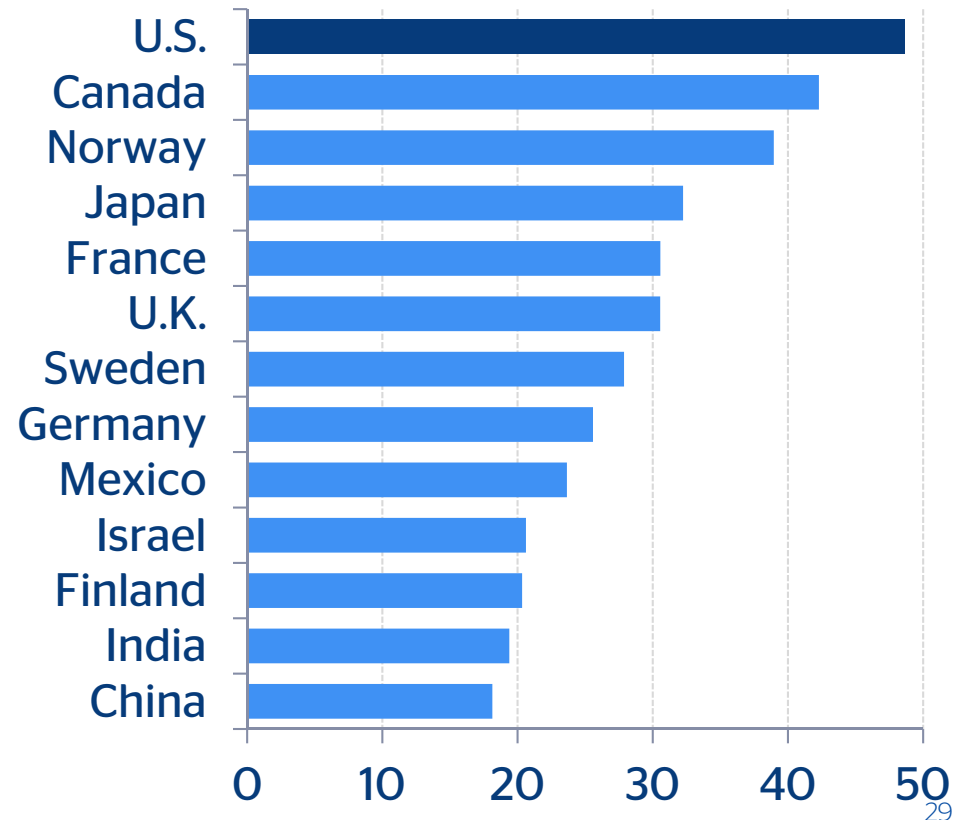
Financial Inclusion: Opportunities

Affordable access to technology is the most efficient, scalable and impactful solution to reaching the financial excluded

Marginal impact on financial inclusion from having internet access

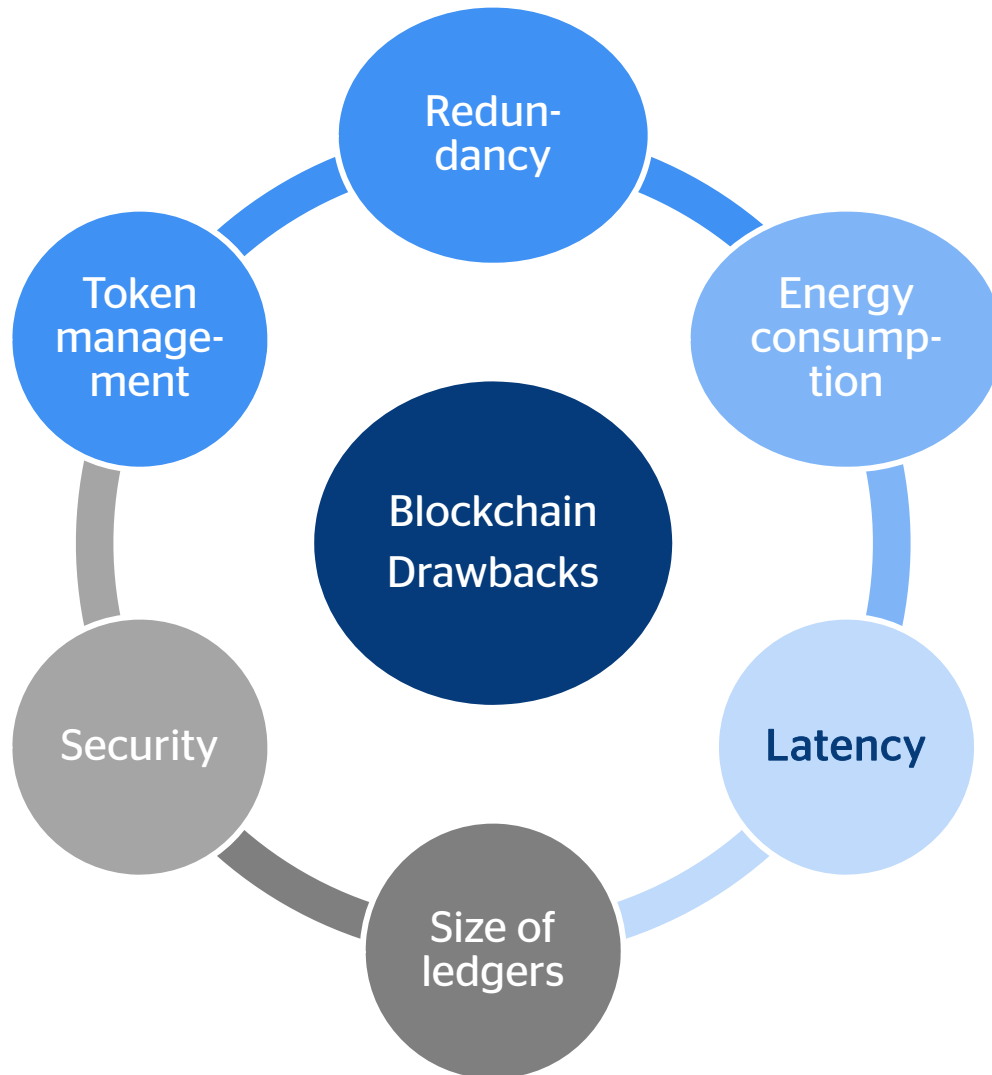


**Internet Cost (Selected Countries)
(10 Mbps, US\$ per month)**



Challenges

A complex environment



Adoption is a matter of when not if

- Mass-market adoption/standards
 - Derivatives (5yrs) & settling share trading (10yrs)?
- Integration into pre-existing systems vs. start from scratch
- Security
 - Sybil attack, DoS, theft, sniffing
- Computing power
- Financial intermediation
- Public Sector
 - Regulators, Government Agencies, Central Banks

Central banks

Some central banks have taken the lead in understanding the new environment. However, significant known & unknown unknowns remain

- High volatility; no central authority monitoring or mitigating fiat currency exchange rates
- Both inflation and deflation risks cannot be mitigated or controlled
- The basic money concept of time value does not apply
- No reference base rate; lending/borrowing interest rates are arbitrary
- No direct (limited indirect) effects from monetary policies
- Consumer protection/financial stability/crime
- Research development and application of new technologies
- Legislation

A payment instrument or an asset class?
Continue monitoring / reassessing risks

Other regulators and industries

Adapting to the new environment

Regulators

Regulate providers

Promote competition

Regulate standards and provide guidance

Tax transactions

Enforce rules and oversee safety

Businesses

Accept in/out payments

Cross border transactions

Use smart contracts

Develop relationships

Improve processes/platforms

Thank You	Merci	Grazie	Obrigado
Teşekkür Ederim	Tak	Gracias	Danke

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