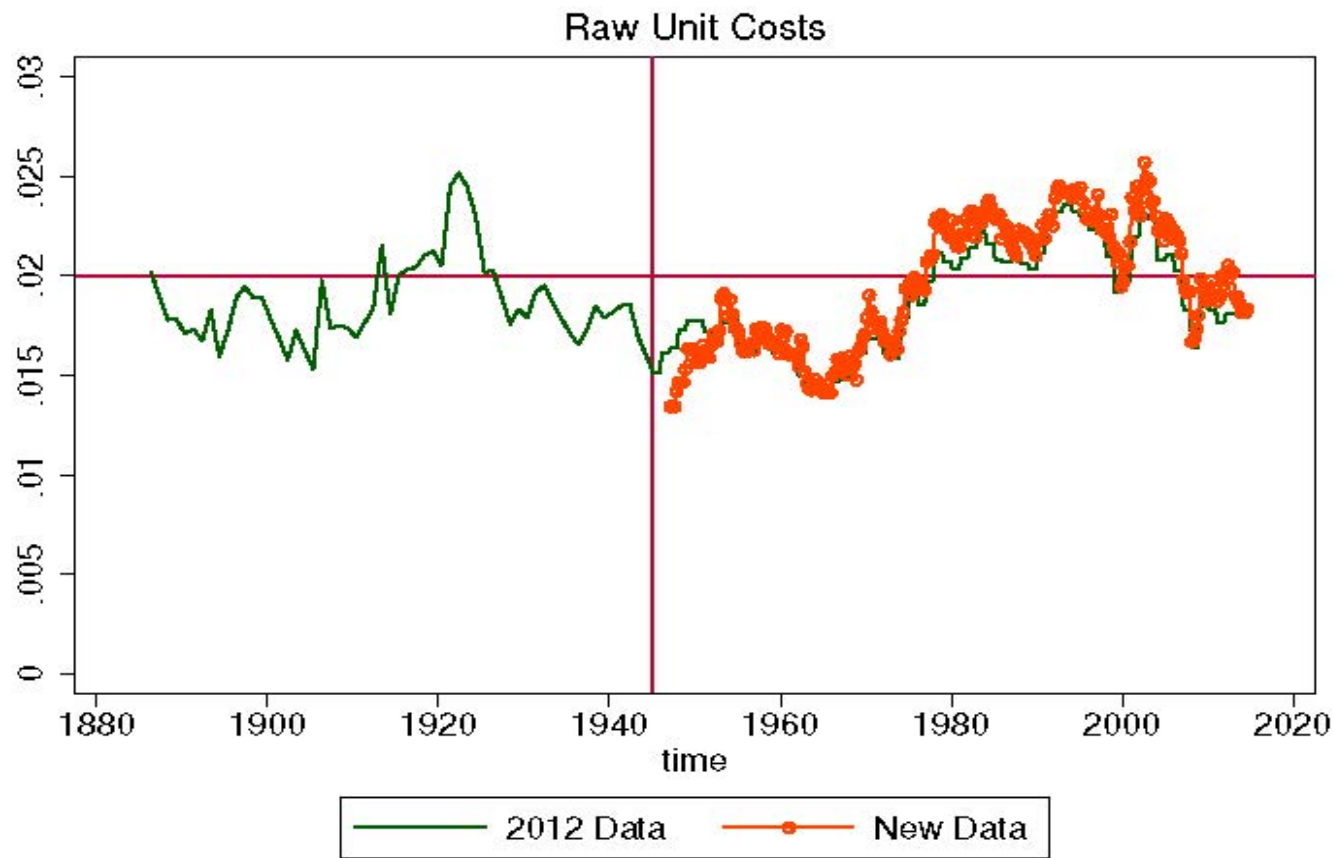


Blockchain and Other New Technologies: Capital Markets in the XXI Century?

Andrei Kirilenko

Centre for Global Finance and Technology
Imperial College Business School

The Costs of Financial Intermediation: 1886-2015



Philippon (2016): “[I]t costs two cents per year to create and maintain one dollar of intermediated financial asset.”

Over the course of the last 130 years!

Why Does Intermediation Remain So Expensive? Not enough technology?

Perhaps financial service industry does not benefit from advances in computing and telecommunication technologies?



Why Does Intermediation Remain So Expensive?

Lack of talent?

It does not not attract smart, rigorously-trained, hard-working people who can make it more efficient?

Why do banks want physics and maths grads?

May 6, 2015 under [Career advice](#), [Graduate](#) | [0 Comments](#)

So you want a job in banking and finance. Why is it that recruiters appear to want you to have a degree in mathematics, computing or physics? What have atoms and the theory of relativity got to do with stocks and shares? We attempt to explain...



OK, Financial Intermediation is Expensive, But Do the Benefits of Finance Exceed the Costs?

THE JOURNAL OF FINANCE • VOL. LXX, NO. 4 • AUGUST 2015

Presidential Address: Does Finance Benefit Society?

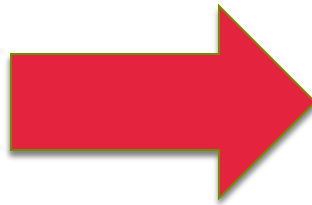
LUIGI ZINGALES*

ABSTRACT

Academics' view of the benefits of finance vastly exceeds societal perception. This dissonance is at least partly explained by an underappreciation by academia of how, without proper rules, finance can easily degenerate into a rent-seeking activity. I outline what finance academics can do, from a research point of view and from an educational point of view, to promote good finance and minimize the bad.

How Can the Costs Be Reduced?

Let's use new technology to lower the costs of an existing process:

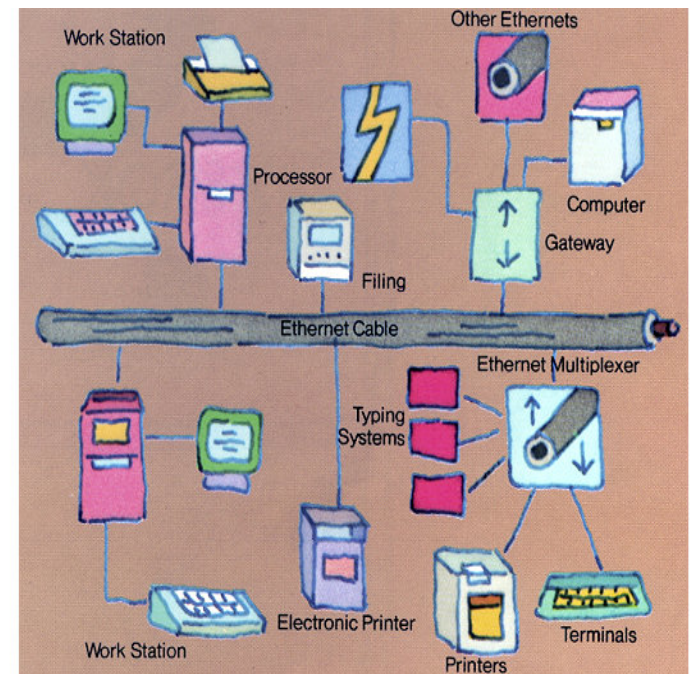
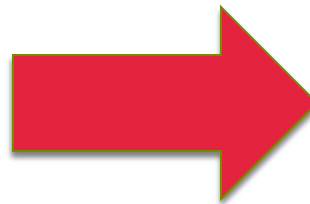
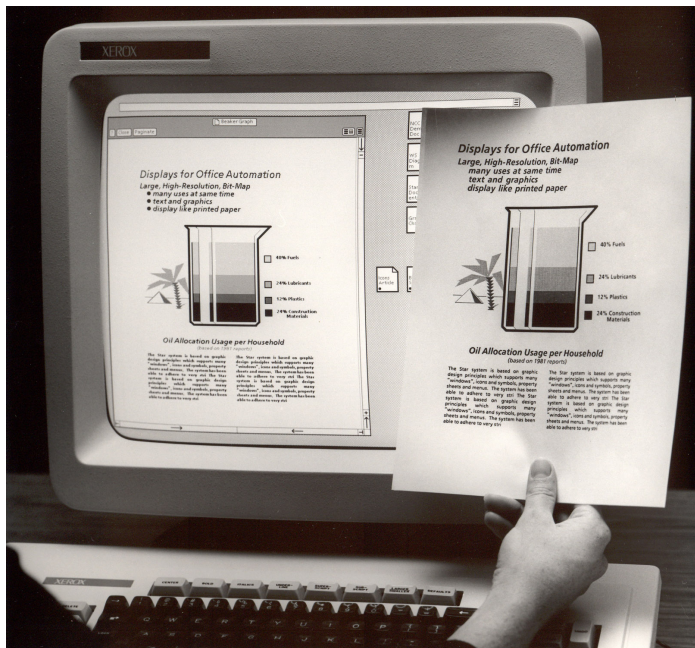


Xerox 4000



How Can Net Benefits Be Created?

Let's use new technology to change the entire process and create new benefits:



How Can Net Benefits Be Increased —per unit of currency of an intermediated asset— by Changing the Process?

Unit of currency: crypto currencies, coins, tokens that can be created digitally (at very low cost)

Need cryptography – so the coins cannot tampered with

Intermediated asset: a ledger to digitally store records of transactions in crypto coins, tokens among agents with digital identities (perhaps not at low costs, but with more possibilities)

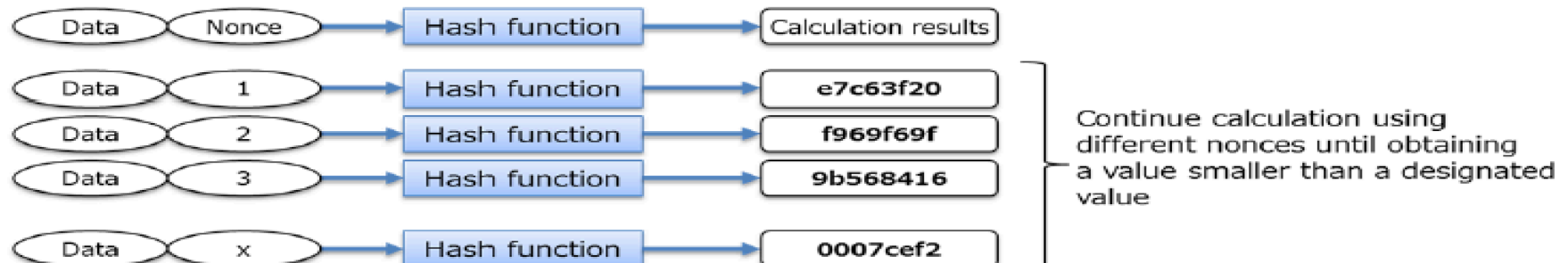
Need more cryptography so (digital) **identities** and **changes** of (digital) **records** cannot be tampered with

Need a process to achieve **consensus** among (digital) parties that quite don't trust each other: proof of work, proof of stake,...

Need a process to allow for executable and enforceable (digital) **actions** based on shared (digital) records: smart contracts

There are THREE main aspects of a public DLT

- ★ Use of cryptographic hash functions, public-private key cryptography and digital signature to verify the **identity** of a sender.
- ★ P2P protocol to search for nodes and/or transmit data about **changes of records**
- ★ Proof of Work or another Po[] mechanism to “**prevent** falsification of data and duplicate payments without a central authority and **maintain** the system against any attacks by malicious users.”



Financial Services Industry Takes Notice

The March of Financial Services Firms into Bitcoin & Blockchain Startups



Fintech Startups Proliferate



Even the Regulators Get Moving on DLT (December 2015)

SECURITIES AND EXCHANGE COMMISSION

17 CFR Part 240

Release No. 34-76743; File No. S7-27-15

TRANSFER AGENT REGULATIONS

AGENCY: Securities and Exchange Commission

ACTION: Advance notice of proposed rulemaking; Concept release; Request for comment

SUMMARY: The Securities and Exchange Commission (“Commission”) is publishing this Advance Notice of Proposed Rulemaking, Concept Release, and Request for Comment on Transfer Agent Regulations (“release”) to seek public comment regarding the Commission’s transfer agent rules. The first transfer agent rules were adopted in 1977 and remain essentially unchanged. At the same time, transfer agents now operate in a market structure that bears little resemblance to the structure in 1977. The release, noting the importance of transfer agents

DLT and Transfer Agents? Yeah, maybe...

70. A new technology, the blockchain or distributed ledger system, is being tested in a variety of settings, to determine whether it has utility in the securities industry.⁴²¹ What utility, if any, would a distributed public ledger system have for transfer agents, and how would it be used? What regulatory actions, if any, would facilitate that utility? How would transfer agents ensure their use of or interaction with such a system would comply and be consistent with federal securities laws and regulations, including the transfer agent rules? Please explain.

⁴²¹ See generally, Nasdaq Announces Inaugural Clients for Initial Blockchain-Enabled Platform “Nasdaq Linq”, Nasdaq (Oct. 27, 2015), <http://www.nasdaq.com/press-release/nasdaq-announces-inaugural-clients-for-initial-blockchainenabled-platform-nasdaq-linq-20151027-00986> (announcement regarding Nasdaq’s use of blockchain technology to create a platform for trading shares of privately-held trading); Matthew Leising, Blockchain Potential for Markets Grabs Exchange CEOs’ Attention, Bloomberg Business (Nov. 4, 2015), <http://www.bloomberg.com/news/articles/2015-11-04/futures-market-ceos-says-blockchain-shows-serious-potential> (discussing financial services industry’s interest in blockchain technology).

Where Is More Work Needed?

Cryptographic technologies are fine: hash functions, digital signatures, tamper-proof strings of blocks

Digital Identities: Creation and validation needs work, compliance with or change in existing regulatory frameworks

Consensus: Needs work, proof-of-work is energy intensive and hard forks have happened, but other protocols are being offered

Issuance and custody of assets: Needs work, but ISDA+templates is a possibility

IPO's of public securities: Needs work on the regulatory side, but IPOs are digital already

Secondary trading: Markets are already digital

Clearing, settlement and recordkeeping: a race for DLT solutions