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How Blockchain Could Disrupt Banking

February 8, 2018

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Blockchain is transforming everything from payments transactions to how money is raised in the private market. As it picks up momentum, will the traditional banking industry embrace this new technology or be replaced by it?

Last September, JPMorgan Chase CEO Jamie Dimon took a stab at Bitcoin: "It's worse than tulip bulbs. It won't end well. Someone is going to get killed."

Lloyd Blankfein, head of Goldman Sachs echoed that thought, saying, "Something that moves 20% [overnight] does not feel like a currency. It is a vehicle to perpetrate fraud."

Yet at the same time, according to a survey by The International Securities Association, 55% of companies polled are monitoring, researching, or developing solutions on top of blockchain.

But this very loud and public backlash against cryptocurrencies from banks begs the question: What do banks have to be afraid of?

The short answer is "a lot."

**WHAT IS BLOCKCHAIN
TECHNOLOGY?**

Become an expert on blockchain in this briefing. We'll provide the definitions and analogies you need to know for bitcoin, blockchain, cryptocurrencies, and more.

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Blockchain technology provides a cryptographically secure way of sending digital assets, without the need for trusted third parties — such as banks. Further, tools such as smart contracts promise to automate many of the tedious processes within the banking industry, from compliance and claims processing, to distributing the contents of a will.

Global banking is currently a \$134 trillion industry. Banks help intermediate payments, make loans, and provide credit. The promise of blockchain as a trustless, disintermediated technology is to disrupt all of that, including:

1. **Payments:** By eliminating the need to rely on intermediaries to approve transactions between consumers, blockchain technology could facilitate faster payments at lower fees than banks.
2. **Clearance and Settlement Systems:** Blockchain technology and distributed ledgers can reduce operational costs and bring us closer to real-time transactions between financial institutions.
3. **Fundraising:** By providing blockchain companies with immediate access to liquidity through initial coin offerings (ICOs), the blockchain is creating a new, cryptoeconomic model of funding that unbundles access to capital from traditional financial services.
4. **Securities:** By tokenizing traditional securities such as stocks, bonds, and alternative assets, the blockchain is upending the structure of capital markets.
5. **Loans and Credit:** By removing the need for gatekeepers in the loan and credit industry, the blockchain can make it more secure to borrow money and provide lower interest rates.

Read on for a deep dive into how the blockchain could turn the traditional banking industry on its head while enabling new business models through technology.

1. Payments

Today, trillions of dollars slosh around the world via an antiquated system of slow payments and added fees.

If you work in San Francisco and want to send part of your paycheck back to your family in London, you might have to pay a \$25 flat fee for the wire, and additional fees adding up to 7%. Your bank gets a cut, the receiving bank gets a cut, and you're charged hidden exchange rate fees. Your family's bank won't even register the transaction until a week later.

The typical cost per transaction for a money sender averages to 7.68%, which come from per-transaction fees associated with

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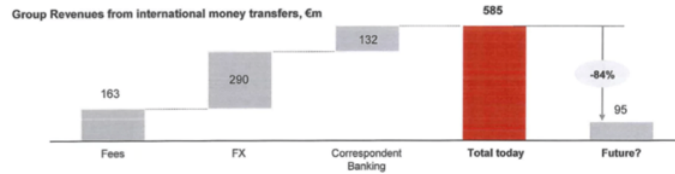
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payments, like wire fees or hidden exchange rate markups. Facilitating payments is highly profitable for banks, providing them with little incentive to lower fees. Cross-border transactions, from payments to letters of credit generated 40% of global payments transactional revenues during 2016.

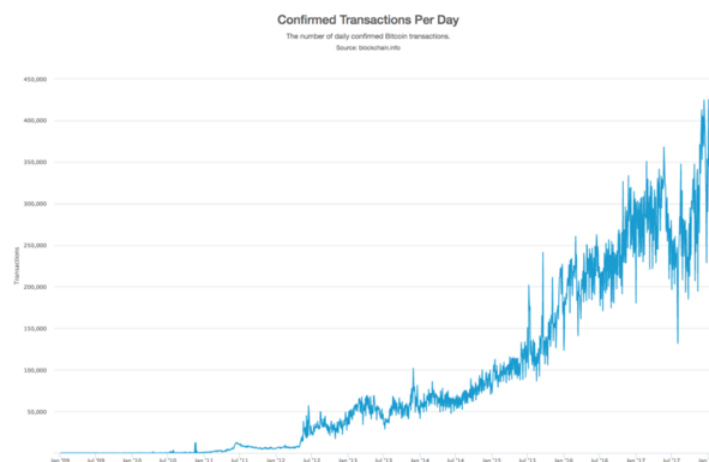


A excerpt from a leaked internal Santander document shows revenues from international money transfers, and the risk of disruption. Nearly 10% of Santander's revenue in 2016 came from international transfers.

Blockchain is disrupting this system by offering a higher-security and lower-cost way to send peer-to-peer (P2P) payments — one that requires no intermediary. Because cryptocurrencies like Bitcoin and Ethereum are built around a public, decentralized ledger that anyone can use to send and receive money, it cuts down on the need for trusted third parties to verify transactions.

In doing so, blockchain technology is giving people around the world access to fast, cheap, and borderless payments.

Bitcoin transactions can take 30 minutes or up to 16 hours — in extreme cases — to settle. That's still not perfect, but it represents a leg up from the average 3-day processing time for bank transfers.



The number of confirmed Bitcoin transactions per day has grown 8x from just over 50,000 in the summer of 2014 to more than 400,000 as of 2018.

Meanwhile, as transaction fees can be high, developers are actively working on scaling cheaper solutions for cryptocurrencies like Bitcoin and Ethereum. Other cryptocurrencies, like Bitcoin Cash,

Revenue

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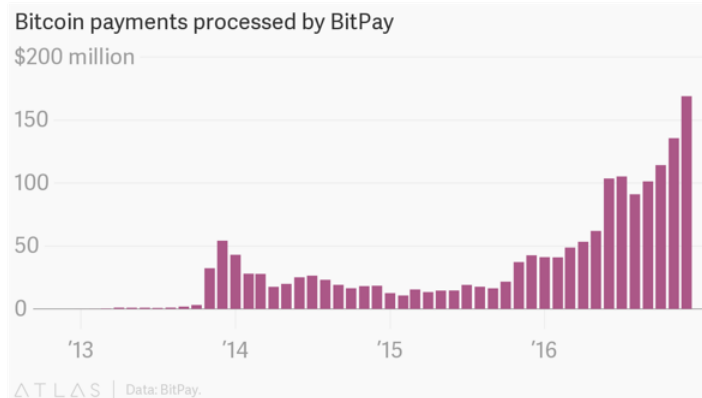
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already have low-priced transactions. Currently, transaction fees on Bitcoin Cash are hovering at around 20 cents per transaction.

One company, TenX, is approaching the payments problem slightly differently. It has built a wallet that's attached to a debit card, making it easy to spend cryptocurrency everywhere you normally use plastic. The company is building a distributed network to trade between different cryptocurrencies and working to integrate that network with physical cards.

While cryptocurrencies are a long way from completely replacing fiat when it comes to payments, the last couple of years have seen exponential growth in transaction volume for cryptocurrencies like Bitcoin and Ethereum. Bitcoin transaction volume grew by 118% in 2016 alone, although much of this was a function of speculative trading (and not P2P payments).

In developing countries today, blockchain promises to give billions of people around the world access to financial services. One example of this is **BitPesa**, a blockchain company focused on facilitating B2B payments in countries like Kenya, Nigeria, and Uganda. BitPesa handles monthly trade volumes of \$10M. Compared to a whopping 9.2% fee charged on the average cross-border payment to Kenya, BitPesa is able to slash fees to 3% through the blockchain.



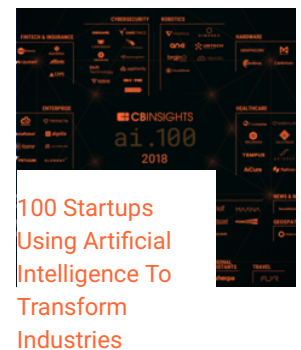
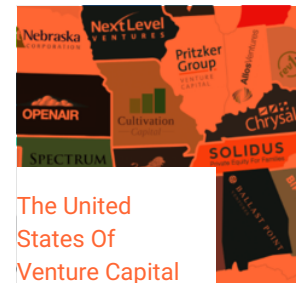
Over the past couple of years, BitPay, a payment processor for Bitcoin, has seen a sharp rise in transaction payment volume.

Another example is **BitPay**, a Bitcoin payment service provider that helps merchants accept and store Bitcoin payments. BitPay has grown its payments volume 328% in the past year, with merchants receiving north of \$110M per month. Compared to the 2%-3% fee associated with credit card transactions, BitPay charges 1% per transaction.

One big reason behind the coming disruption of the payments industry is the fact that the creaky infrastructure supporting it is just as liable to disruption — the world of clearance and settlements.

2. Clearance and Settlements Systems

POPULAR DATA VISUALIZATIONS

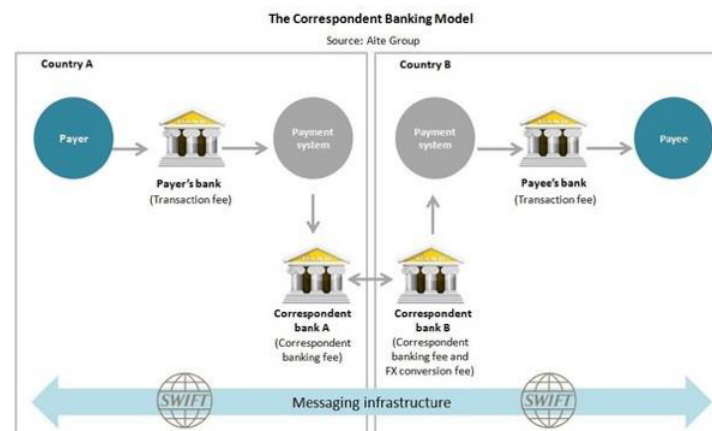


The fact that an average bank transfer — as described above — takes three days to settle has a lot to do with the way our financial infrastructure was built.

It's not just a pain for the consumer. Moving money around the world is a logistical nightmare for the banks themselves.

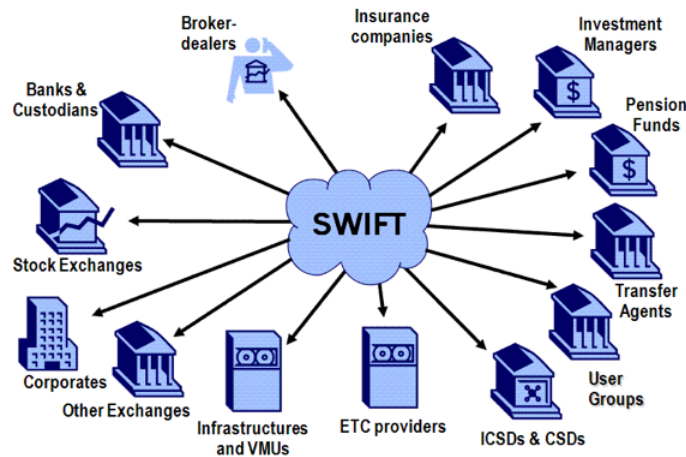
Today, a simple bank transfer — from one account to another — has to bypass a complicated system of intermediaries, from correspondent banks to custodial services, before it ever reaches any kind of destination. The two bank balances have to be reconciled across a global financial system, comprised of a wide network of traders, funds, asset managers and more.

If you want to send money from a UnicaCredit Banca account in Italy to a Wells Fargo account in the US, the transfer will be executed through the Society for Worldwide Interbank Financial Communication (SWIFT), which send 24 million messages a day for 10,000 financial institutions.



Because UnicaCredit Bank and Wells Fargo don't have an established financial relationship, they have to search the SWIFT network for a correspondent bank that has a relationship with both banks and can settle the transaction — for a fee. Each correspondent bank maintains different ledgers, at the originating bank and the receiving bank, which means that these different ledgers have to be reconciled at the end of the day.

The centralized SWIFT protocol doesn't actually *send* the funds, it simply sends the payment orders. The actual money is then processed through a system of intermediaries. Each intermediary adds additional cost to the transaction, and creates a potential point of failure — 60% of B2B payments require manual intervention, each taking between 15-20 minutes.



The blockchain, which serves as a decentralized “ledger” of transactions, can completely disrupt this state of play. Rather than using SWIFT to reconcile each financial institution’s ledger, an interbank blockchain could keep track of all transactions publicly and transparently. That means that instead of having to rely on a network of custodial services and correspondent banks, transactions could be settled directly on the blockchain. That would help alleviate the high costs of maintaining a global network of correspondent banks.

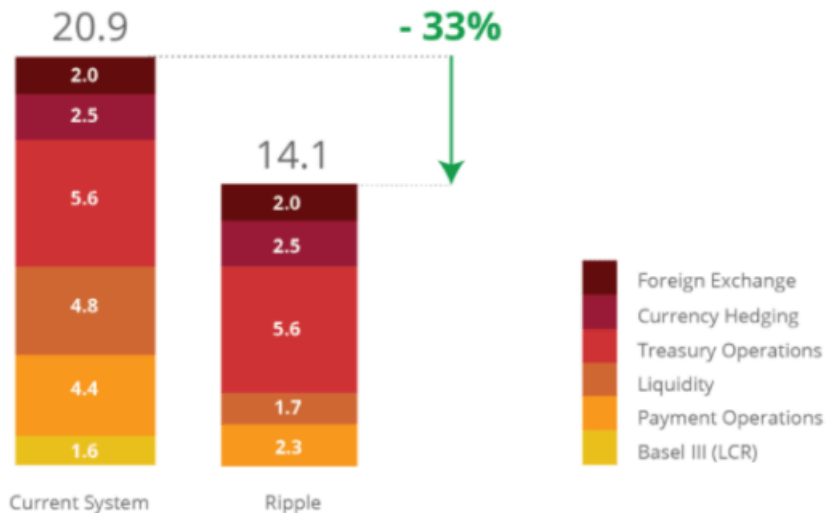
Banks have estimated that blockchain innovation could cut at least \$20B worth of costs from the financial sector by providing better infrastructure for clearance and settlements.

Ripple, an enterprise blockchain services provider, is the most prominent player attempting to replace SWIFT. While the company is best known for its associated cryptocurrency, XRP, this is separate from Ripple’s banking products.

SWIFT messages are one-way, much like emails, which mean that transactions can’t be settled until each party has screened the transaction. By integrating directly with a bank’s existing ledgers, Ripple’s xCurrent product provides banks with a faster, two-way communication protocol that permits real-time messaging and settlement. Ripple currently has over 100 customers signed up to experiment with its blockchain network.

International Payment Infrastructure Costs

Global Average Cost: 20.9 bps on payment volume



Source: Ripple

R3 is another major enterprise blockchain player catering to banks, and wants to be the “new operating system for financial markets.” It raised \$107M from a consortium of banks like Bank of America Merrill Lynch and HSBC. It’s also lost some key members, such as Goldman Sachs, which departed because it wanted more operational control over R3.

While projects like Ripple and R3 threaten to disrupt players within the broader financial services ecosystem — like SWIFT or custodian banks — they’re also working with traditional banks to bring greater efficiency to the sector. Ripple and R3 seek to decentralize systems on a smaller scale than public blockchains by connecting financial institutions to the same ledger in order to increase efficiency of transactions.

Blockchain projects are doing more than just making existing processes more efficient, however. They’re creating entirely new types of financial activity. The fundraising space is perhaps the best example of this.

3. Fundraising

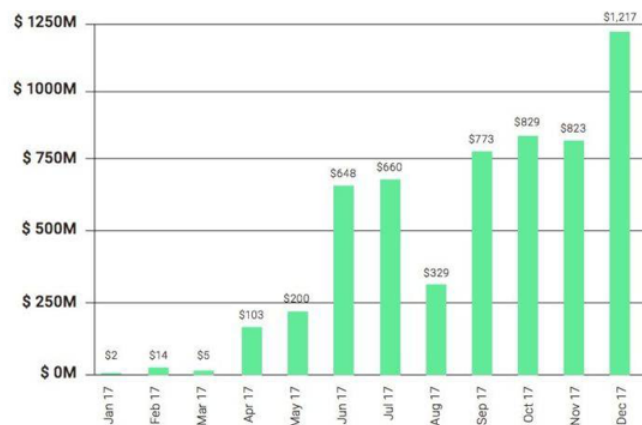
Raising money through venture capital is an arduous process. Entrepreneurs put together decks, sit through countless meetings with partners, and endure long negotiations over equity and valuation in the hopes of exchanging some chunk of their company for a check.

On the blockchain, you don't need a platform to raise money. You don't need venture capitalists. You don't have negotiations. Anyone is free to raise money from anyone at any time, and anyone can invest in projects they find interesting. In the parlance of Naval Ravikant, it is "open, distributed, and liquid all the way."

On the blockchain, fundraising takes the form of an initial coin offering (ICO). It's the blockchain version of an IPO. Projects sell tokens, or coins, in exchange for a cryptocurrency like Bitcoin and Ethereum. The value of the token is — at least in theory — tied to the success of its implementation in the future. Investing in tokens is a way for investors to bet directly on usage and value. Through ICOs, blockchain companies can short-circuit the conventional fundraising process by selling tokens directly to the public.

Over the course of 2017, a whopping \$5.6B was raised through ICOs.

USD Raised by ICOs in 2017 - Monthly Totals



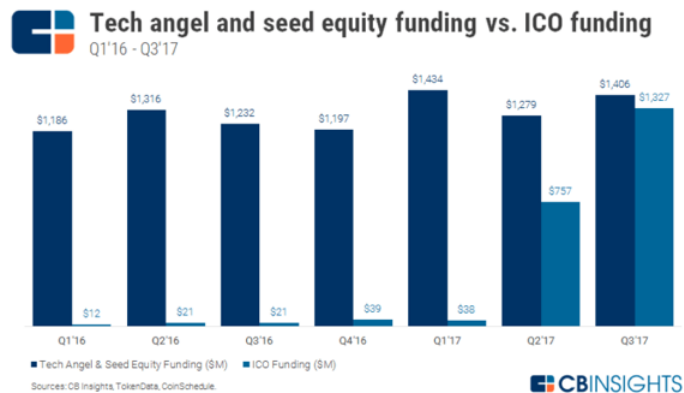
The popularity of ICOs has exploded in 2017, with the total amount during the first half of 2017 coming to \$1.13B.

There are a couple immediate benefits to ICOs for blockchain companies.

First, ICOs occur globally and online, giving companies access to an exponentially larger pool of investors. You're no longer limited to high-net-worth individuals, institutions, and others who are able to show the government that they're credible investors.

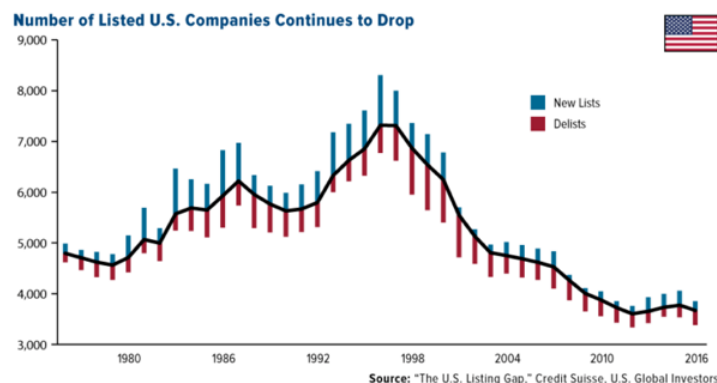
Second, ICOs give companies immediate access to liquidity. The moment you sell a token, it's priced on a 24-hour global market. Compare that to ten years for venture-backed startups. As Earn CEO Balaji Srinivasan says, "the ratio between 10 years and 10 minutes to get the option of liquidity is up to a 500,000x speedup in time."

We're already seeing the impact of ICOs on the fundraising market. In Q3'17, the deal size of ICOs totaled \$1.3M — close to the deal size of all tech angel and seed deals that quarter at \$1.4M.



Venture capital is taking notice, with VC firms like Sequoia, Andreessen Horowitz, and Union Square Ventures all directly investing in ICOs, as well as gaining exposure by investing in cryptocurrency hedge funds. David Pakman, a partner at Venrock, says, "There's no question that crypto will disrupt the business of venture capital. And I hope it does. The democratization of everything is what has excited me about technology from the beginning."

As the ICO boom is well underway, we're simultaneously seeing a broader decline in the market for IPOs, from 7,322 in 1996 to 3,671 in 2017. In 2016, total funds raised from US IPOs dropped to a low of \$18.5B, compared to \$74.4B in 2014. It's still not table stakes — fees to investment bankers per IPO can range from 3.5% – 7%. With greater access to private capital and alternative fundraising methods such as ICOs, we can expect to see this profitable market for investment banks decline even further.



The amount of money raised by ICOs in 2017 was already over 6% of the funds raised by IPOs in the US during the same period. Low interest rates and higher regulation have made private funding more attractive to many startups than the public markets.

While the majority of ICOs thus far have been for pre-revenue blockchain projects, we're seeing more and more technology companies build around a paradigm of decentralization. Telegram, the messaging app, for example recently announced that it's trying to raise \$2B via ICO. Telegram offers a free service with high user growth — but its lack of revenue makes it unlikely to succeed in the public markets. The idea behind the ICO is to sell tokens to users

and bootstrap a payment platform on top of the messaging network.

If, as blockchain advocates predict, the next Facebook, Google, and Amazon are built around decentralized protocols and launched via ICO, it will eat directly into investment banking margins.

Several promising blockchain companies have emerged around this space.

Companies like **CoinList**, which began as a collaboration between Protocol Labs and AngelList, are helping bring digital assets to the mainstream by helping blockchain companies structure legal and compliant ICOs. CoinList has helped blockchain companies raise over \$850M via ICOs.



Demand for Filecoin's ICO on CoinList was so high that it caused server overload within an hour of launch. Filecoin ultimately raised over \$250M via ICO.

It has developed a bank-grade compliance process that blockchain companies can access through a streamlined API, helping projects ensure everything from due diligence to investor accreditation. While CoinList's platform is designed for blockchain projects, its focus on reducing the logistical and regulatory load around fundraising is being mirrored in the public markets. Investment banks today are experimenting with automation to help eliminate the thousands of work hours that go into an IPO.

And CoinList is just the start. A number of companies are emerging around the new ICO ecosystem, from Waves, a platform for storing, managing, and issuing digital assets, to Republic.co's crypto initiative, which is aimed at helping people invest in ICOs for as little as \$10.

While the majority of ICOs thus far have been for pre-revenue blockchain projects, they have the potential to expand much further and become a viable alternative to traditional funding.

We're still in the early stages of the blockchain, and likely in a bubble. There's no doubt that many of these projects will fail altogether. What's interesting is that they're testing out uses for the

blockchain that replace functions of traditional banks. That's not just limited to company fundraising, but also to the underlying fabric of securities.

4. Securities

To buy or sell assets like stocks, debt, and commodities, you need a way to keep track of who owns what. Financial markets today accomplish this through a complex chain of brokers, exchanges, central security depositories, clearing houses, and custodian banks. These different parties have been built around an outdated system of paper ownership.

Say you want to buy a share of Apple stock. You might place an order through a stock exchange, which matches you with a seller. In the old days, that meant you'd spend cash in exchange for a certificate of ownership for the share.

This grows a lot more complicated when we're trying to execute this transaction electronically. We don't want to deal with the day-to-day management of the assets — like exchanging certificates, bookkeeping, or managing dividends. So we outsource the shares to custodian banks for safekeeping. Because buyers and sellers don't always rely on the same custodian banks, the custodians themselves need to rely on a trusted third party to hold onto all the paper certificates.

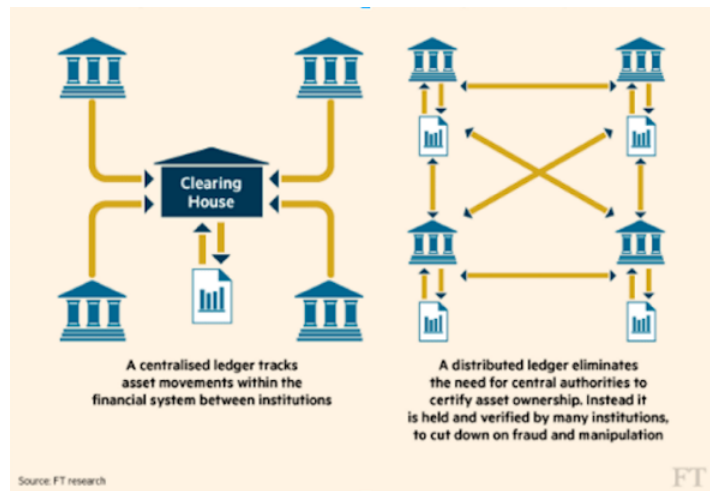


To settle and clear an order on an exchange involves multiple intermediaries and points of failure.

In practice, that means that when you buy or sell an asset, that order is relayed through a whole bunch of third parties. Transferring ownership is complicated because each party maintains their own version of the truth in a separate ledger.

Not only is this system inefficient, but it's also imprecise. Security transactions take between 1 to 3 days to settle because everyone's books have to be updated and reconciled at the end of the day. Because there are so many different parties involved, transactions often have to be manually validated. Each party charges a fee.

Blockchain technology promises to revolutionize financial markets by creating a decentralized database of unique, digital assets. With a distributed ledger, it's possible to transfer the rights to an asset through cryptographic tokens. While Bitcoin and Ethereum have accomplished this with purely digital assets, new blockchain companies are working on ways to tokenize real-world assets, from stocks to real estate to gold.



The potential for disruption is massive. The four largest custody banks in the US — State Street, BNY Mellon, Citi, and JP Morgan — each oversees over \$15+ trillion worth of assets under custody. While fees are typically lower than .02%, profits come from the sheer volume of assets. Using the blockchain, tokenized securities have the potential to cut out middlemen such as custodian banks altogether, lowering asset exchange fees.

Big 4 Dominate Market



The four largest custodian banks in the US each manage \$15+ trillion in assets under custody. Source: Trefis

Further, through smart contracts, tokenized securities can work as programmable equity — paying out dividends or performing stock buybacks through a couple lines of code. Finally, putting real-world assets on the blockchain has the potential to usher in broader, global access to markets.

Polymath is one of the blockchain companies that wants to help

migrate trillions of dollars of financial securities to the blockchain. Polymath is building a marketplace and platform that helps people issue security tokens, and implement governance mechanisms to help these new tokens meet regulations. So far, Polymath has announced partnerships with SPiCE VC, Corl, and Ethereum Capital to launch security tokens on the platform.

ST's will dominate the blockchain universe



The slide above from Polymath predicts that the market for security tokens will grow to \$10 trillion by 2020.

Meanwhile, financial institutions themselves aren't sitting still. The Australian Stock Exchange announced an effort to replace its system for bookkeeping, clearance, and settlements with a blockchain solution developed by Digital Asset Holdings.

Last June, **Chain**, an enterprise-focused blockchain company successfully orchestrated live transactions between the Nasdaq and Citi's banking infrastructure via integration. Meanwhile, Overstock's CEO is launching a trading platform called tZero, which wants to create a blockchain-backed dark pool, or private exchange, for securities that might be listed on the Nasdaq.

While tokenized assets are a hugely promising use case for the blockchain, the biggest hurdle is regulatory. It's still unclear if ownership on the blockchain is legally binding, while tokens remain an ambiguous term that don't currently have legal standing. Regulatory and legislative guidance will be key to the success of these nascent projects.

The worlds of the consumer, the financial institution, and blockchain are slowly converging. Another space where that convergence has the potential to completely upend the way finance operates today is lending and credit — a domain that's no stranger to disruption.

5. Loans and Credit

Traditional banks and lenders underwrite loans based on an inaccurate and insecure system of credit reporting.

When you fill out an application for a bank loan, the bank has to evaluate the risk that you won't pay them back. They do this by looking at factors like your credit score, debt-to-income ratio, and

home ownership status. To get this information, they have to access your credit report provided by one of three major credit agencies: Experian, TransUnion, and Equifax. Based on that information, banks price the risk of a default into the fees and interest collected on loans.

| Loans by Category (\$ bil) | Wells Fargo | Bank of America | JPMorgan Chase | Citigroup | U.S. Bancorp | Top 5 Total |
|----------------------------|-------------|-----------------|----------------|-----------|--------------|-------------|
| Residential Mortgages | 345 | 263 | 281 | 138 | 82 | 1,109 |
| Commercial Loans | 206 | 290 | 161 | 159 | 87 | 902 |
| Credit Card Loans | 36 | 93 | 130 | 145 | 21 | 425 |
| CRE Loans | 142 | 75 | 115 | 19 | 39 | 391 |
| Retail Loans | 83 | 78 | 63 | 25 | 33 | 282 |
| All Other Loans | 134 | 133 | 169 | 135 | 21 | 592 |
| Total Loans Outstanding | 946 | 933 | 918 | 621 | 282 | 3,700 |

The five biggest US banks control \$3.7 trillion worth of commercial lending.

This centralized system is often hostile to consumers. The Federal Trade Commission estimates that one in five Americans have a “potentially material error” in their credit score that negatively impacts their ability to get a loan. Further, concentrating this sensitive information within three institutions creates a lot of vulnerability. Last year’s Equifax hack exposed the credit information of 143M Americans.

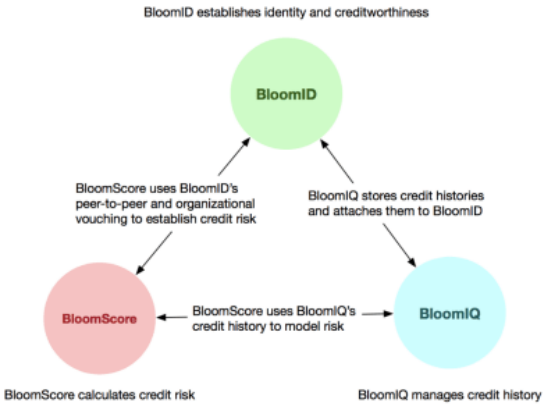
Alternative lending on the blockchain offers a cheaper, more efficient and more secure way of making personal loans to a

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apply for loans based on a global credit score.

While blockchain projects in the lending space are still in their infancy, there are a couple of interesting projects out there around P2P loans, credit, and infrastructure.



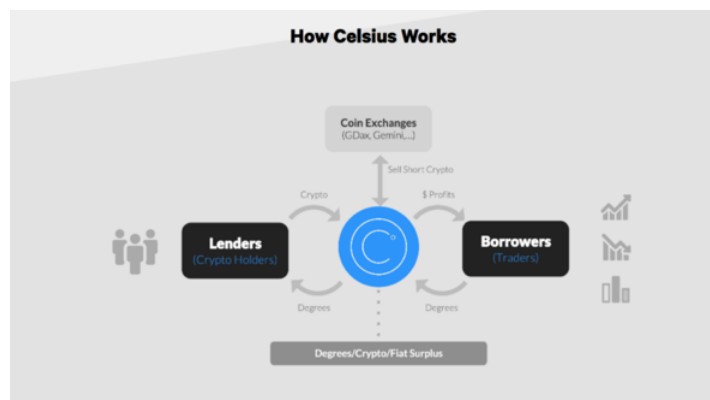
The Bloom protocol seeks to issue credit based on a track record of successful identity attestation on the network, without trusted third parties.

One project, SALT, is a lending platform for blockchain-backed loans that raised \$48M via ICO. You buy a SALT token to become a member of the network, and then put up some cryptocurrency

holdings as collateral. That allows you to borrow money from lenders on the platform. Pay your loan back on time, and you get your crypto back. SALT's not starting off taking on the lending industry as a whole. Its wedge is helping people with crypto-assets get short-term cash.

Another project, EthLend, recently raised \$16.2M via ICO. EthLend wants to build a decentralized peer-to-peer lending application on top of Ethereum. This is how it works: when a borrower issues a loan request, a smart contract is created with the loan amount, interest rate, and time frame. The borrower puts up tokens of EthLend as collateral. If the loan isn't paid in time, the lender receives tokens as collateral.

Celsius, another P2P blockchain company, takes less of a free-market approach. Co-founder Alex Mashinsky says: "We offer members the chance to get paid high interest when they have a positive balance in the wallet and give them access to a credit line with low interest when they run out of cash at the end of the month."



Creating a blockchain-powered loan industry requires more than just platforms — it takes the development of standards and infrastructure. Development is well on its way. Dharma, for example, is a protocol for tokenized debt. It aims to provide developers with the tools and standards necessary for building online debt marketplaces. Meanwhile, Bloom wants to bring credit scoring to the blockchain, and is building a protocol for managing identity, risk, and credit scoring on the blockchain.


While most of these projects focus on creating liquidity through loans around people's existing crypto assets, they're also jumpstarting the infrastructure that will enable bigger disruption in loans via blockchain.

Beyond the hype

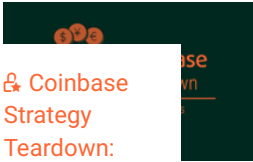
Disruption doesn't happen overnight. Blockchain technology is still in its infancy, and a lot of the actual technology has yet to be perfected. Die-hard believers in cryptocurrency believe that it will replace banks altogether. Others think that blockchain technology will supplement traditional financial infrastructure, making it more

efficient. One thing is clear, however: blockchain will indeed transform the banking industry.


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