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FT Explainer: The blockchain and financial markets

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Banks and exchanges are all taking a keen interest in applying the blockchain, the record of asset ownership that underpins bitcoin, to financial markets. It mixes Silicon Valley and Wall Street and could represent a radical departure from longstanding financial networks.

How does it work?

At present, when one bank sends money to another, no physical currency changes hands. Banks and settlement systems use central electronic ledgers to track assets. But they can be slow and inefficient, often relying on faxes or manual input. That not only wastes time but racks up fees. The system is also open to hacking and fraud.

Embedding distributed ledger technology
 A distributed ledger is a network that records ownership through a shared registry

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The blocks are gathered as blocks and broadcast to a network of computers. Transactions between bitcoin users are gathered into a chain. Transactions between bitcoin users are gathered as blocks and broadcast to a network of computers.

Those gathering the blocks are known as “miners”, and compete to verify them by unscrambling standard cryptographic puzzles derived from their contents.

The “winner” publishes the result to other computers and receives a monetary incentive. A new block is added to the blockchain roughly every 10 minutes, containing the transactions of the last 10 minutes. Other computers then verify the work.

The open source code means it can be widely distributed and stored, decentralising it. Altering it would require changing every copy.

What’s in it for financial markets?

Proponents say a ledger updated in minutes could save millions in collateral and settlement costs, while also automating banks’ creaky and expensive back office systems. Collateral could also be moved around the system faster, to meet new rules on derivatives markets implemented after the financial crisis.

Santander InnoVentures, Anthemis and Oliver Wyman estimated distributed ledger technology could cut \$15bn-\$20bn from banks’ costs for cross-border payments, securities trading and regulatory compliance by 2022.

Banks are looking at other ideas, such as programming “smart contracts” that can verify and execute commercial agreements.

What’s the catch?

The blockchain was never directly aimed at overhauling financial markets. As a result it contains flaws, critics argue. Computing processing power requires electricity — a real world cost. Already mining is controlled by a small group of actors, using huge farms of servers. That creates potential issues. If the monetary incentive for mining does not outweigh the cost of running servers, will there be enough miners?

The “longest” chain of blocks — the one with greatest sum of work done — is accepted as the ledger. An actor attempting to modify it would need control of enough computing power to overtake the genuine block chain as the longest. If he controls the

majority of the network's computing power — even temporarily — he could alter the ledger. Without that it becomes difficult to distinguish — legally — who owns what.

The system can show fallibility. Recently Bitcoin.org, a closely watched industry site, warned some computers were generating “invalid blocks”. In effect the computers were more incentivised to win new bitcoins and did not validate existing transactions. (Since invalid blocks costs miners money, they assumed the chain was correct).

Others worry that the blockchain is growing too big and inefficient to deal with a growing number of transactions. When the invalid blocks were found, Bitcoin.org suggested customers waited for 30 confirmations — or five hours — before accepting transactions.

What if these problems were ironed out?

“Ultimately every financial transaction is recorded by at least two parties,” the Bank of England noted last year.

Without certainty of legal enforcement of contracts and security concerns, others accept that a central authority has a role to play. Real-world goods — like commodities — may be settled but still require proof of delivery. The blockchain is a protocol and does not have the ability to identify parties. Banks point out that they must comply with tough regulations around money laundering.

Then there's the clearing problem. A securities clearing house can net offsetting long and short trades from brokers. If positions cancel each other out, the member has to put up little margin to the clearing house. A distributed ledger would require the clearing house to settle long and short positions per client — a huge extra burden. Trades would also have to be pre-funded, which is such a drag on market liquidity that countries like Russia have moved away from same-day settlement.

Derivatives clearing is about managing margin on outstanding contracts. “In a derivatives world, I have all the incentive to get margin (paid) when my contracts are in the money, but the incentive to leave things alone when my contracts are in the red,” says one specialist. “If a bank is dealing with someone unsophisticated then the other side may not know that they can demand a margin payment.”

So how about settlement?

As with any new technology, experimentation abounds. The term “blockchain” is becoming difficult to define. For instance there is a growing debate about whether a blockchain even needs a digital token like bitcoin.

Some start-ups are turning to “permissioned” distributed ledgers, where permission is granted to approved actors to access the network, and quickly record trades and discover asset ownership.

Companies like Hyperledger do not use blocks but a more traditional, consensus algorithm that could mean transactions could be settled in under 400 milliseconds. Whether that is still a “blockchain” is another matter.

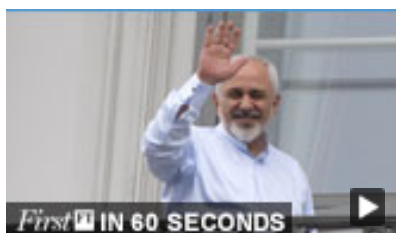
Critics say at that point, distributed ledger technology becomes less of a revolutionary tool and merely the next stage of back office IT infrastructure.

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