BLOCKCHAIN IN THE CASH AND SECURITIES SETTLEMENT SPACE: UTOPIA OR REALITY?

Dominic Hobson talks to Professor Andreas Park

It was the high level of transparency of blockchain networks that first attracted the attention of Andreas Park, associate professor of finance at the University of Toronto. The models he built and ran concluded that his intuition about the power of transparency to change market interactions for the better was correct, and that peer-to-peer trading through blockchain networks can reduce transaction costs for large investors even if they are less than fully transparent. Now, says Professor Park, the surge in Initial Coin Offerings (ICOs) is validating his view that it is imperative for the leaders of the securities and payments industries and their regulators and advisers to analyse the fundamental changes that the new market environment engenders.

"The one thing that really jumped out at me as I read about blockchain was this high level of transparency," says Andreas Park, associate professor of finance at the University of Toronto. "Because, when you have a high level of transparency, that changes the nature of economic interactions." No mind was better prepared for that insight than Professor Park, who has spent more than a decade assessing the economic impact of digital technology on financial markets. In fact, without his deep knowledge of high frequency and dark trading of Canadian equities, he might well have missed the centrality of transparency to the issuance, trading and settlement of securities on a blockchain.

By the time a Canadian industry contact and friend drew his attention to the blockchain in 2015, Park was already exasperated by the constraints of the data he needed to research securities trading. "I have access to some proprietary data, from which I have masked information about the counterparties, but it gives me no insight into the identity of the underlying investors," he explains. "There are strong non-disclosure agreements to protect the data, and it is difficult to get access to the kind of data that has the level of detail necessary to conduct a deep analysis. The contrast with the blockchain could not be greater. All the information about the trades that people have made is visible to everyone. You know who traded what in the past, and who holds securities now. I thought that was really big."

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That thought sparked a search for a theoretical model which could help conceptualise what such a radical level of transparency might do to financial markets. The result was a paper, first circulated in 2016.1 In it, Professor Park and his co-author Katya Malinova describe how blockchain technology can offer investors new options for managing the degree of transparency of their holdings and their trading intentions. In any financial market, transaction costs and market impact are minimised when large traders can trade with other large traders without having to go via a highly intermediated stock exchange or other trading platform in search of counterparties. But it is obviously hard for large sellers to find large buyers without disclosing their positions and their trading intentions. Instead, they tend to break their trades into smaller lots, and look to aggregate orders from smaller counterparties.

Many trading identities are more efficient than one

"In the current world, it is hard for large investors to find the right counterparty, because they do not know who owns what, and has an interest in trading, and the capacity to absorb your position," says Park. "One example is the market for corporate bonds, where it can be hard to find the right counterparty for a trade. As a result, a lot of trading goes on through intermediaries, where you have to trade at high transaction costs. It also imposes a negative externality on smaller traders who want to trade in the same direction. It follows that, if we could take the large traders out of the intermediated market, and have them interact directly with one another on a peer-to-peer basis, it would create a better market environment for everyone. The question that we address in our paper is, `Can we make that happen?'

In their paper, Park and Malinova answer that question by showing that un-intermediated, fully transparent, peer-to-peer trading on a blockchain between large but easily identifiable holders of securities achieves the best outcome for investors. On a cursory reading, it is easy to mistake this finding for a statement of the obvious. Everybody knows that the purpose of any financial market is to connect issuers and investors and that the plethora of intermediaries in both the primary and the secondary markets – investment banks, underwriters, brokers, exchanges, custodians, real-time gross settlement platforms (RTGSs), central counterparty clearing houses (CCPs) and central securities depositories (CSDs) – represent potentially unnecessary transaction costs.

However, the implications of the central finding of the paper are more profound than a superficial reading suggests. As Park explains, the finding helps establish a benchmark, which facilitates comparison of the peculiarities in the different designs of blockchains. One of the peculiarities of any blockchain is that, while the counterparties are anonymous to each other, ownership records and transactions are visible to all members of the network. Naturally, large buyers and sellers of a security are no more eager to disclose their positions and intentions on a blockchain than they are on a stock exchange or in a dark pool, so they will continue to split their holdings. The difference on a blockchain is that they can do it across multiple identities and addresses, instead of across multiple intermediaries and trading platforms.

What Park and his co-author found, when they ran theoretical models of a blockchain network that used both single and multiple identities, is that multiple identities worked better for large investors than the current approach of splitting trades between intermediaries and the market in general. It was not, however, as good as a market in which large traders could identify each other and the size of their positions directly, even after taking into account the inevitable accompaniment: the cost of moving the market against the trade as other participants front-ran it. But using multiple anonymous identities did have the compensating virtue of being realistic. Despite the evidence, large traders are unlikely to be persuaded of the value of being transparent about their identities and positions.

"On a public blockchain, with lots of different identities, it still proved easier for the larger counterparties to find each other," explains Park. "Within our model, there is a much higher level of interaction between the large traders than there is with the current system, in which traders have one identity and there is no transparency. That increased interaction increases the efficiency of trading, because the most efficient market is the one in which the large traders can find one another easily. If large traders do not want everybody to know what their holdings are, then it is better to have a market in which they spread their holdings over multiple identities than one in which they have only one identity, or even a limited number of identities, and no transparency. It is not ideal, but it is the best we can achieve, given the desire to be non-transparent, and blockchain makes it possible."

Trust through transparency

Park adds that this observation is the clue to his principal motivation for writing the paper. "We wanted to establish a framework that helps the designers of private blockchains to understand the trade-offs of their design choices," he says. "Transparency is a main point of contention, but it is also very powerful." Which makes it noteworthy that the model posited by the paper incorporates fewer intermediaries than the current marketplace supports. "Peer-to-peer trading through a network that is populated by large investors is implicit to our paper," explains Park. "In principle, once we put securities on a blockchain, we do not need brokers, custodians, RTGSs or CSDs, and we may even be able to disintermediate the CCPs. Instead, issuers will interact directly with investors, and investors with each other. All they need is the network. There is a lot of potential for eliminating inefficiency."

The reason that blockchain is the most suitable technology for these peer-to-peer networks is that it solves the principal problem created by disintermediation: the loss of trusted intermediaries to guarantee that counterparties are who they claim to be, that sellers own the asset they want to sell, and that buyers are good for the money. It is another way in which transparency is essential to the success of the technology. "In the classical blockchain, it is the proof-of-work that creates the integrity of the data," explains Park. "The fact that everybody can see the past transactions, and that therefore everybody can reconstruct who had what at each point in time, creates

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1 Katya Malinova and Andreas Park, Market Design with Blockchain Technology, University of Toronto, 30 May 2016. **Read**

Attend Andreas Park's session at Sibos:

Blockchain in the cash and securities settlement space: Utopia or reality?

Conference room 3
Monday 16 October 2017
09.30-10.30

Moderator

Andreas Park
Associate professor of finance, University of Toronto

Panellists

Alexis Francis Thompson
Head of global securities services – managing director, BBVA

Tom Casteleyn
Head of product management for custody, cash and foreign exchange, BNY Mellon

Monica Singer
Independent FinTech expert, Blockchain Consultancy (Pty) Ltd

Andrew McCormack
Senior director, technology. Payments Canada

Dirk Bullman
Adviser, European Central Bank

trust. Blockchain incorporates a high, native level of transparency that changes the information environment, and so changes the economics of interactions."

As Park points out, blockchain has one further advantage: enhanced security. "Central databases can be hacked," he says. "With a distributed database, the same information is kept at many different locations. This means that anyone who wants to hack a distributed ledger has to hack it at a majority of the locations, and that is a difficult feat for a hacker to accomplish. In terms of security, blockchain confers a massive advantage."

This does not mean blockchain networks are invulnerable. While a distributed ledger reduces the risk of a catastrophic loss of data to terrorism, natural disaster or cyber-attack, Park thinks excluding bad actors from the network is the most important consideration in any discussion about the relative merits of executing payments and securities transactions on public or private blockchains. "There are many reasons why it will be difficult to have securities trades and money transfers on a public blockchain," he says. "But chief among them is Know Your Client (KYC) and Anti-Money Laundering (AML) requirements. There is always a risk of fraudulent or other criminal transactions, and you need systems that have the ability to reverse fraudulent transactions."

The immutable is not reversible but it can be overridden

Reversibility is not, of course, an option in the current iterations of public blockchain networks. After all, the integrity of the network depends on transactions being immutable. Instead, a second transaction will have to be initiated to undo the effects of the first. "The easiest way to change a fraudulent transaction is not by going back to the block where the fraudulent transaction is recorded, but by adding a new transaction, and reversing it that way," explains Park. "With a public blockchain, that is not possible, because you can only initiate such a transaction if you have the private keys, and criminals are not going to make those available to you. Transactions even in a private blockchain should be immutable, in the sense you cannot change the past, but, unlike the public blockchain, you can change the past in a private blockchain by appending something new into the chain."

It follows that public blockchains, on which every transaction is immutable and cannot be reversed even by a subsequent transaction, are unlikely to be authorised by regulators to trade cash or securities. "Governments may hesitate to take these kinds of value transfers seriously," says Park. "We still have the rule of law, in which a judge can order the reversal of a payment. If governments do not take such transfers seriously, then there is a significant risk that they are not legally binding. Which is why it is difficult to imagine that we will ever have the majority of true value transfers in cash and securities over public blockchains. It is much more likely that we will have privately arranged blockchains. What I find much easier to imagine is a world in which we have no banks, and instead see assets transacted on peer-to-peer networks on blockchains organised by, for instance, large technology companies. All that is needed is users subject to a set of rules. That is the likeliest outcome."

Despite that conjecture, Park notes that users are already creating new facts that may alter the trajectory of the markets, by using public blockchains to issue and trade securities. "In the first few months after we circulated the paper in May last year, the initial reaction from our academic colleagues was deeply sceptical," he recalls. "Nobody thought that financial assets could ever be listed and traded on a blockchain, because neither issuers nor investors would trust the counterparties they interacted with on a blockchain. Now we see billions being raised in ICOs that not just raise funds but involve the offer and sale of securities. While it is true that a lot of shenanigans are going on, securities are now being issued and traded and settled on public blockchains. You can see who holds the assets, and you can see peer-to-peer transactions. When we first circulated our paper, it was like science fiction. Blockchain-based trading is no longer years away. It is becoming real."

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