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The role of fintech startups and big banks in shaping trust expectations from blockchain use in mainstream financial markets

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ABSTRACT

Through two qualitative case studies we explore the role of a fintech and a big bank in shaping trust expectations of blockchain use in mainstream financial markets. Drawing on Zucker's theory of trust we explore adaptations to the original blockchain made by these actors, and show how such changes may impact trust expectations from blockchain use. Our analysis identifies a blockchain innovation trajectory involving the co-evolution between technological changes and trust expectations as it moves from supporting cryptocurrency exchanges to mainstream business settings. Furthermore, we show that fintech startups and established big banks align their strategies with the widespread generalization and acceptance of blockchain as a sector-wide information infrastructure and position themselves in co-dependent relationships within the emerging blockchain marketplace. Industry practitioners may gain insights on how to best navigate this innovation space.

1. Introduction

Blockchain is understood as a decentralized, transactional database technology that facilitates validated, tamper-resistant transactions consistent across a large number of network participants called nodes (Glaser, 2017; Beck et al., 2018). It initially became known as the underlying technology supporting the cryptocurrency Bitcoin, usually for illegal or semi-legal purposes. More recently it started being considered for use in mainstream corporate and public sector settings. Indeed, around 2015, blockchain started gaining prominence in industry discussions, particularly concerning its capacity to reshape trust dynamics within mainstream markets (Underwood, 2016). The premise is that the need for third party intermediaries to verify market transactions is eliminated and instead trust is reallocated to market participants themselves (Buitenhek, 2016). For blockchain users to be able to handle the trust requirements themselves, they would expect to have access to all transaction information and assurances that this information has not been tampered with. Furthermore, they would expect a generalized framework of behaviour extending beyond the confines of a single transaction, forming part of a broader "world known in common" (Schutz, 1962), which participants would take for granted (Rossi et al., 2019). Trust in this context, therefore, could be defined as a set of expectations, such as the ones described above, shared by all those involved in an exchange (Zucker, 1986: 2).

These trust expectations are explicitly articulated in the blockchain protocol – the technical rules governing how transaction information is accessed and validated by participants (Rossi et al., 2019). Indeed, transparency allowing users to see and understand the status of each transaction (Beck et al., 2016), and immutability of transaction information, guaranteeing a 'single truth' for those involved (Beck et al., 2018; Naerland et al., 2017), are key features of the blockchain protocol. As blockchain is considered for use in mainstream financial markets, however, emerging evidence suggests that its protocol could undergo reevaluation and negotiation to better align with the requirements of individual organizations (Du et al., 2019) and even entire sectors (Gomber et al., 2018). It is also envisaged that overtime blockchain users may develop an intersubjective understanding of the protocol rules, beyond their manifestation during single transaction events, and instead approach it as a blockchain infrastructure they collectively take-for-granted (Star and Ruhleder, 1996; Pereira et al., 2019; Rossi et al., 2019). Changes to the original blockchain protocol are therefore likely to impact both what blockchain users expect during individual transactions, but also from blockchain as a technology more broadly.

Key industry actors, such as, fintech startups and various established

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big banks, inspired by blockchain's potential, engage with its exploration at various levels. Specifically, they are involved in both re-evaluating and negotiating blockchain's original protocol for potential business applications, but also in re-inventing and promoting blockchain as a legitimate technology more broadly across the sector. The exact nature of their role in reshaping blockchain for mainstream use, however, remains unclear. For example, existing research portrays fintechs and big banks both as competitors and collaborators, offering conflicting views of their relationship and how it influences blockchain innovations.

We therefore identify a research gap in relation to the ways in which trust expectations from blockchain use may change when it is adapted for mainstream use, and the role of two key actors (banks and fintechs) in this process. Through two qualitative case studies of a fintech startup and a big bank, we explore the following research questions:

a) How is blockchain adapted for use in mainstream market settings and how may changes affect participants' expectations of trust?
b) How may big banks and fintech startups contribute to shaping trust expectations in mainstream market settings and how do they generalize these across the financial services sector?

Our analysis identifies a blockchain innovation trajectory involving the technology-trust co-evolution across different business settings (i.e. from crypto to mainstream business). Furthermore, we highlight the emergence of a marketplace for trust expectations as embodied in individual blockchain use-cases and we show how key actors position themselves within it, albeit in co-dependent relationships.

The rest of the paper is structured as follows: We start with a literature review, which helps explain key concepts and flesh out our lines of inquiry, then we present our qualitative case study methodological approach, followed by our empirical findings, a discussion and a concluding section.

2. Blockchain and trust

Blockchain allegedly has potential to transform organizations and the economy more broadly and lead to the fourth industrial revolution (Kimani et al., 2020). It is seen as enabling the emergence of distributed autonomous organizations making up a 'blockchain economy' (Beck et al., 2018; Andersen and Bogusz, 2019). A central part of that discussion includes effects that blockchain will have on trust (Beck et al., 2018; Risius and Spohrer, 2017; Tapscott and Tapscott, 2018). In fact, it has been described as a 'trust machine' by mainstream industry outlets to denote its potential (The Economist, 2015). In a market context, trust may be defined as a "set of expectations shared by all those involved in an exchange" (Zucker, 1986:2). Two types of expectations have been identified: a) *constitutive expectations*, which are the explicit rules defining the context of a specific situation or exchange (Zucker, 1986); and b) *background expectations*, or social expectations (Neu, 1991) constituting the implicit, taken-for-granted aspects of markets, not tied to any singular situation but inherent in a shared "world known in common" (Schutz, 1962; Sucker, 1986). Both components are necessary for trust to exist but their importance in trust production will vary depending on the relative amount of each: Abundant background expectations, for example, diminish the need for constitutive expectations, i.e. for transaction rules to be stated explicitly, while if there is a need for constitutive expectations in order for trust to exist, then background expectations are invalidated (Zucker, 1986).

2.1. Constitutive expectations: re-evaluating the blockchain protocol

In the case of blockchain, constitutive expectations are formally stated on the blockchain protocol. It encompasses the intricate technical rules governing the production of the blockchain, the human agents' rights to read, submit and validate transactions, as well as the blockchain's capacity to process a maximum number of transactions within a given time (Rossi et al., 2019). The main rules upon which constitutive expectations of trust are based on are: a) transparency, which allows users to see and understand the status of a transaction (Beck et al., 2016); and b) immutability of information recorded for each transaction, which guarantees a 'single truth' for all participants (Beck et al., 2018; Nærland et al., 2017).

As blockchain is considered for mainstream market settings, however, relevant literature suggests that it is possible for its original protocol to be re-evaluated and adapted to the specific operational requisites of individual organizations (Du et al., 2019) or entire industrial sectors such as financial services (Gomber et al., 2018). As Gomber et al. (2018) argue: "There is nothing to hold back changing the manner in which blockchains work, for example, by adjusting their security levels, shifting them from having public and transparent contents to making them available for private viewing and interactions only" (Gomber et al., 2018: 238). Moreover, concerns about scalability at the business application level may lead to the setup of several 'forks', thus changing the original protocol (Andersen and Bogusz, 2019). Such adaptations may be regarded as efforts to re-write the constitutive expectations of trust for blockchain use in order to appeal to the requirements of mainstream industry actors.

There has been research, for example, exploring potential business applications on blockchain (Guo and Liang, 2016). These include accounting systems (Dai and Vasarhelyi, 2017), business process management (Mendling et al., 2018) modelling applications (Toorajipour et al., 2022), smart contracts (Egelund-Müller et al., 2017), cross-border payments (Quibria, 2015), supply chains (Kshetri, 2018). In such business applications, adaptations in the blockchain protocol, either through extensive negotiations over design choices or subsequent renegotiations to further align the protocol to future changing business needs (Rossi et al., 2019), could alter constitutive expectations of trust for blockchain users. Mainstream blockchain use, therefore, is likely to require a rewrite of the constitutive expectations of trust. In this paper we explore the role of banks and fintech startups in this process.

2.2. Background expectations: promises and organizing visions

Background expectations are not specific to a transaction but serve as a general framework of behaviour and rely on individuals or organizations mutually identifying themselves as members of the same community (Zucker, 1986). Each individual transaction on blockchain, for example, can be verified by a peer-to-peer network of users (Swan, 2015; Mas and Chuen, 2015; Beck and Müller-Bloch, 2017). Participants in this network, typically see things in the same way, use the same interpretive frame, and may go back to trace and review past transactions (Beck and Müller-Bloch, 2017). Central to this community, is an expectation that the transparency and immutability of individual transactions is generalized to all transaction records on blockchain (Beck et al., 2018). Background expectations, therefore, although they may arise within a local exchange, subsequently and over time they may be reconstructed as intersubjective and generalize beyond a single transaction (Zucker, 1986: 12). Overtime, a version of the blockchain protocol may become taken-for-granted and accepted as a blockchain infrastructure known in common by its users (Rossi et al., 2019; Star and Ruhleder, 1996).

While elements of constitutive expectations of trust on blockchain use may exist in early articulations of mainstream business applications, such as those mentioned earlier, these have not yet been generalized into background expectations manifested on a taken-for-granted blockchain infrastructure (Rossi et al., 2019). Indeed, in mainstream markets, background expectations currently have the form of 'promises' (Pollock and Williams, 2016) and 'organizing visions' (Swanson and Ramiller, 1997; Ramiller and Swanson, 2003) aiming to grab the attention of market actors, build confidence in blockchain as an emerging technology and mobilize the material and intellectual resources needed for blockchain to become widely accepted (Pollock and Williams, 2016). Promises of a future blockchain infrastructure beyond cryptocurrencies

include secure and privacy-friendly data sharing across institutions (Polyviou et al., 2019). Key actors, such as big banks and fintech startups who are inspired by blockchain's future potential, engage in interpreting its promises and visions and mobilize market resources and power (Newell et al., 2001; Currie, 2004) to legitimize and disseminate them across the sector (Swanson and Ramiller, 1997). Their exact role, however, remains unclear.

2.3. The role of big banks and fintech startups in generalizing blockchain

In relevant literature there seem to be conflicting views on the banks' and fintechs' role in blockchain generalization across the sector. On the one hand, fintechs are commonly depicted as disruptors that lead blockchain diffusion by introducing innovative business models (Gomber et al., 2018), which help widen the pool of its users (Navaretti et al., 2017) and challenge the status of big banks (Beck and Müller-Bloch, 2017). Fintechs, therefore, are seen as spearheading the process of blockchain generalization by articulating alternative innovative value propositions, while existing dominant software players are limited to 'observing' them (Grover et al., 2019). Established banks, on the other hand, despite recognizing certain merits in adopting blockchain (Chang et al., 2020; Kawasmi et al., 2020; Angelis and da Silva, 2019), are frequently portrayed as rigid organizations, reluctant to fully embrace blockchain adoption (Gomber et al., 2018) and hesitant to endorse its use in financial services (Brandl and Hornuf, 2020).

Contrasting evidence shows that banks and fintechs frequently engage in strategic collaborations (Klus et al., 2019; Hornuf et al., 2020). Within these alliances, banks may be seen as leading blockchain generalization through stretching the boundaries of what they already know, learning to absorb external knowledge and expertise from fintechs (Beck and Müller-Bloch, 2017) and bring blockchain into the mainstream. At the same time, fintechs are seen as seeking alliances with big banks to potentially gain access to financial resources and compliance know-how that would allow them to scale (Klus et al., 2019) and broaden their customer base (Hornuf et al., 2020). Given the conflicting approaches, questions are raised on how exactly big banks and fintechs contribute to blockchain's wider acceptance in mainstream financial markets and the future realization of promises and visions associated with it.

3. Methodology

This research explores two research questions:

a) How is blockchain adapted for use in mainstream market settings and how may changes affect participants' expectations of trust?
b) How may big banks and fintech startups contribute to shaping trust expectations in mainstream market settings and how do they generalize these across the financial services sector?

3.1. Research design

This study spans across various locations and sites (Marcus, 1995; Hine, 2007), ranging from developments and interactions occurring at a local level of individual transaction events to the broader socio-technical industry environment. For this reason, we construct laboriously our research site (Amit, 2000) which consists of case studies of two organizations, one fintech startup and one established bank. The purpose of the case studies is to illustrate the role and views of key industry actors in the blockchain space and also their design choices in specific projects. Data were collected through ethnographic methods of participant observation in blockchain industry events and qualitative semi-structured interviews with representatives of fintechs and banks from within and outside the case study organizations.

3.2. Data collection

Fieldwork commenced in September 2016 and periodically continued until September 2019. Given that the case organizations we selected had a strong presence in blockchain-related industry events, we decided to include these in our data sources. However, we expanded our data collection beyond what was relevant to the two companies, to capture the broader blockchain industrial landscape. Specifically, we observed large-scale global gatherings but also smaller meetups on relevant topics. In total, we attended approximately 66 h across ten events (Table 1). In these we had the chance to hear participants speak about specific projects and present views and strategic aspirations. Our role was as 'involved researcher' with direct involvement in the field, as opposed to an 'outside researcher' who mainly carries out a study through formal interviews (Walsham, 2006). What gave us an involved status was the fact that we were able to speak out about our research, share our opinions and ask questions. This also added transparency to our data collection as we made our role clear to event participants from the outset. Data emerged in the form transcripts of recordings of event sessions for which permission was asked in advance. Where recording was not possible, the data had the form of researchers' notes. Additionally, we conducted personal semi-structured interviews with individuals from our case organizations and from the broader blockchain industry landscape (Table 2). Interview questions touched upon a number of technological, organizational, discursive and strategic aspects, as well as views on blockchain's future status across the financial services sector. All interviews were between 60 and 90 min and participation was voluntary.

The data we collected from blockchain events and interviews yielded a wealth of insights with conceptual depth and richness that substantiated our theoretical assertions (Hennink and Kaiser, 2019). In essence, our data collection process yielded a substantial understanding of how the focal actors – the fintech startup and the big bank – interpreted trust expectations during and beyond transactions, how choices were made to address trust requirements at different levels, and finally on their strategic positioning in the emerging blockchain marketplace.

3.3. Data analysis

In our analysis we assumed a sense-making role allowing ourselves to be led by the social setting, and unexpected insights to emerge from the data (Schultze, 2000). To the extent that we relied on our own subjective

Table 1
Events attended for data collection.

Name	Approx hours of observation	Date
The Deutsche Bank Tech Talk: Banking in a Digital World	2.5	1/11/2016
Digital Disruption in Financial Services	3	16/11/2016
Blockchain Technology and the Future of Banking	4	22/11/2016
Blockchains in Asset Management by UCL Centre for Blockchain Technologies	2	29/11/2016
Hyperledger London Meetup	4	14/12/2016
Blockchain Expo Global	18	23–25/01/2017
Blockchain Expo Global	12	18–19/04/2018
Blockchain Summit	12	27–29/06/2018
Scaling and privacy solutions in blockchain	3	07/04/2018
Blockchain Expo Global	6	25/04/2019
Total	**66.5**	

Table 2
Personal interviews.

Interview number	Interviewee role	Date
1	FIN-B (case firm startup): Chief Innovation Officer	11/12/2016
2	Big-B (case firm bank): Analyst in Blockchain Exp. Team	13/01/2017
3	FIN-B (case firm startup): Founder	19/01/2017
4	Big-B (case firm bank): Analyst in Blockchain Exp. Team	27/01/2017
5	Fintech startup entrepreneur 1(not from case firms)	21/09/2018
6	Industry expert (not from case firms)	27/11/2018
7	Fintech startup entrepreneur 2 (not from case firms)	06/02/2019
8	Fintech startup entrepreneur 3 (not from case firms)	15/03/2019
9	Fintech startup entrepreneur 4 (not from case firms)	01/05/2019

Table 3
Data analysis process.

Key actors	Analytical dimensions	Example themes
Role of banks and fintechs	**Discourse level** (Blockchain and trust)	Interpretations of blockchain-related discourse (e.g. trust machine, transparency etc)
	Organisational level (Constitutive expectations of trust manifested on blockchain protocol)	Choices on specific use-cases; organisational arrangements, mutual shaping between protocols and business requirements
	Industry level (Background expectations of trust manifested in promises and visions and how they are diffused across the sector)	Views on the state of the industry; nature of relationship between banks and fintechs; adoption and diffusion dynamics, strategic positioning of actors etc.

engagement with the phenomena in order to generate insights, we consider ourselves as ethnographic instruments (Schultze, 2000). Indeed, because both authors participated in data collection, each of us with different backgrounds and views, we engaged in confessional self-reflexive discussions (Schultze, 2000) both prior and after a data collection event. For example, prior to an interview or a blockchain event we met and designed bespoke instruments for data collection (observation strategies, interview guides). These discussions were scheduled around weekly review meetings during the period of September 2016 to September 2017. During this period, the second author of this paper was leading fieldwork activities. From September 2017 to September 2019, the first author was leading the fieldwork activities while holding monthly review meetings with the second author. During these meetings we were also able to counterbalance each other's biases. For example, blockchain event attendance would often immerse us into an atmosphere saturated with promotional language and optimism surrounding the potential of blockchain. Reflexive discussions, however, were instrumental in tempering the initial enthusiasm captured in the empirical material. By engaging in these reflexive conversations, we ensured a well-rounded perspective, mitigating the influence of any initial biases and promoting a balanced and comprehensive understanding of the information collected.

As data emerged from the field, themes were identified and filtered through analytical categories derived from our theorization. As shown in Table 3, categories include *discursive aspects* i.e. actors' interpretations of trust requirements; *organizational aspects* i.e. actors' adaptations of the blockchain protocol to business requirements; and *industry aspects* i.e. actors' roles in diffusion and generalization of blockchain across the sector. Regarding the process of identifying relevant themes, some emerged in a straightforward manner via explicit statements from our interviewees or blockchain event speakers (e.g. providing a definition of a concept, or stating the business needs of an organization); whereas others had to be developed from observations and interpretations of data, beyond what informants said on the surface (e.g. the relationship dynamic between banks and fintechs). In the following section we present the empirical data from the two case studies, written up in the form of a thick description that reflects our interpretive understanding of the phenomenon under investigation, enriched with illustrative quotes when necessary to highlight certain points.

4. Empirical findings

4.1. The fintech startup: interbank payments use case

FIN-B (pseudonym) was founded in September 2016 with a mission to build a technology which "*is supposed to make the world more transparent and trustworthy*" (interview with founder). To achieve this mission, FIN-B formed a partnership with a large international financial organization. They built a "showcase platform" and invited a number of European banks to explore its potential. The focus of this endeavor is on bank-to-bank transactions. Interbank payments outside the European Economic Area have to go through a correspondent bank[1]: "*I'm a bank in the UK transferring money to a bank in the US. If I have a direct relationship with them, I might have an account in that bank with $1 million and they might have an account in my bank with £0.5 million. If I want to make a payment to them, I can either credit their account in the UK or they can debit my account in the US. But if the two banks don't have this relationship, they need to find a common correspondent bank they both have a relationship with.*" (interview with FIN-B founder).

In the above example there might be one or multiple correspondent banks, each one of which represents a counterparty risk and unknowns, such as, cost of transferring the funds, and time taken to complete the transfer. These unknowns make interbank payments an opaque and risky operation. The CIO of FIN-B explains: "*Banks don't know how long it's going to take to process a payment if you're paying someone in South America. They are not just unwilling to tell you, they don't know* […] *There's a lack of transparency, a lack of traceability. If you order something from the US and it gets FedExed over to me, I can track that shipment every step of the way, but my payment, I can't!*".

4.1.1. Adapting blockchain protocol to the needs of big banks: a layered approach to transparency

Interbank payments on blockchain promise perfect traceability and transparency. A public blockchain with an open protocol, however, is not seen as suitable for big banks. Instead, a private blockchain where

[1] If bank A owes money to bank B in the UK, they will do a net settlement through Faster Payments or CHAPS. At a European level there is Target 2 [a European-wide CHAPS] system where several central banks are involved and the European Central Bank directs cash between them. There are various national payment systems and there is also SEPA.

transaction data would be segregated is preferable. For their platform, FIN-B followed the data segregation approach so that only parties to a specific transaction are able to see the transaction details. FIN-B's CIO, speaking at the Future of Banking event, explains: "*There might be bank A, bank, B, there might also be a network operator, a custodian or central bank, a regulator, an auditor with several touch points along that network. There's a lot of different levels of access required and you have to take a tiered approach. When we talk about our blockchain platform, we don't just talk about our blockchain. Technology-wise we have multiple blockchains running in that system, every company is running their own. There are tiered cross-blockchain transactions, so we have to tier those together, to create both the scalability and the privacy that suits the larger enterprises*".

This is a layered approach with a main blockchain where everyone runs a node on and several sub-chains run by different organizations. All participants in a specific transaction can see all of the transaction details, while everybody else can only see 'fingerprints' of that transaction. This way, full privacy is guaranteed for transaction participants, while at the same time there is some degree of auditability across the main blockchain network. The FIN-B executives see this as a compromise between keeping the benefits of the original blockchain (transparency and immutability) but adapting it to the privacy needs of the transacting banks.

The layered approach also addresses the needs for big banks for scalability. For big banks the public blockchain is seen as unsuitable because it does not scale to the amounts of data they are processing. The CIO of FIN-B explains: "*If everyone stores everything you don't just have your data centre to maintain, everybody has to maintain the whole world's data centre, which does not scale at all*".

Overall, the specific platform caters to the privacy and scalability needs of the big banks. This means that the full transparency and immutability of the original blockchain protocol are seen as important, however, these are kept at a local level of individual transactions and for only a few select participants at a time. FIN-B CIO compares their blockchain with bitcoin: "*Bitcoin is more of a 'wild west' in that it is trying to make sure that nobody can do anything they shouldn't do, full stop. What we're trying to do is nobody can do anything they shouldn't do without all of the required parties knowing exactly what they have done.*".

4.1.2. FIN-B: "selling" ideas to big banks

FIN-B's business objective, according to their founder and CEO is: "*How do we bring* [*blockchain*] *to big companies, big industries, banks*". FIN-B, then, position themselves as a seller of blockchain ideas to established corporate players. What they sell is packaged using relevant discourse, namely aspects of transparency and immutability. FIN-B's founder, for example, adopts the widespread definition of blockchain as a trust mechanism: "[*Blockchain is*] *a shared database. Everyone that has* [*access*] *are potential witnesses to those transactions, so once data is entered into that, you no longer need to trust that central party.*". Moreover, they refer to benefits from immutability: "*I like to call the blockchain as 'the arbitrator of disagreement'. You can take data on blockchain at face value*". Besides selling to specific banks, FIN-B's objective is also to help diffuse blockchain on a mass scale to the point that it becomes the main shared infrastructure for all blockchain platforms currently appearing in the emerging blockchain marketplace: "*What I really want to see is pulling this together on a global scale and providing that backbone that enables all of these other blockchains, all these projects that are happening around the world, to come together.*".

Besides blockchain ideas, FIN-B also sell a unique approach to testing these ideas. In the words of a financial services consultant, FIN-B and fintechs more generally "*bring a more agile approach to testing the new ideas that they bring to the banks. The idea of being able to test something on a small scale and then 'scale up or fail fast' isn't necessarily an approach that the big banks can take, but fintechs can bring that attitude to the big banks*". Such an approach reflects an attitude towards risk. A blockchain evangelist uses the parachute metaphor to explain: "*Jumping out of a plane* […] *big banks want detailed proof that the parachute works, whilst startups jump out of the plane and then deal with the parachute afterwards*". The above is also true for FIN-B.

Finally, to be successful idea sellers to big banks, FIN-B develop relevant capabilities. These include selling, interpretation and negotiating capabilities. Selling capabilities include demonstrating organizational awareness of the big bank environment and their business priorities. FIN-B's Chief Innovation Officer (CIO) explains: "*You are not just selling to the bank, you are selling to particular individuals who report certain things to their key stakeholders in different departments. That internal process is something that needs understanding and as a startup trying to innovate with a bank you need to work out what is the bank trying to get from this project and what are their goals overall and also the goals of the people involved.*". Interpretation capabilities include the ability to re-interpret and contextualize the original blockchain protocol to the requirements of the big banks. This puts them in opposition to the crypto and cypherpunk blockchain movements. FIN-B's CIO confirms: "*The purists wouldn't like it* [*i.e. adapting the original protocol*]. *But that's a given. I mean, they wouldn't like that we're working with banks in the first place*". Finally, negotiating capabilities involve the flexibility to negotiate with big banks an influential role for them in blockchain projects. For example, they could play the role of network operators, coordinating transactions and granting access to transaction data to various participants. FIN-B's CIO explains: "*You've got different banks, you've got network operators, so we're looking whether we could operate that*".

In summary, as a fintech startup, FIN-B, while aligning with the core principles of the original blockchain discourse around transparency and immutability, modifies the original protocol in their products, introducing a layered transparency model. They do so to enhance the attractiveness of blockchain for banks, providing the needed assurance that specific transaction information can be kept private. At the same time, their strategy does not seek to challenge the dominance of big banks in financial services. Instead, their goal is to capture their attention and sell them compelling blockchain ideas.

4.2. The big bank

4.2.1. Use cases: adaptations of the original protocol

BIG-B (pseudonym) is a British multinational investment bank and financial services company. They became interested in blockchain in 2014. To explore blockchain, BIG-B mobilized internal organizational resources and established a "blockchain experimentation team" which embarked on a systematic hunt for use cases, both internally and externally. The remit of this team was to look across the businesses of the bank (retail, credit card, investment banking, corporate banking), identify new use-cases and educate the organization on blockchain-related matters. Locating specific individuals within various business teams was an essential part of this process. Such individuals were important in promoting the idea and driving innovation within the organization. An interviewee from BIG-B's blockchain experimentation team explains: "*We would look across group, educate the business on what the bank and the various business areas could be interested in. We would speak to that group, find someone from that group that has interests in the blockchain use-case and develop propositions from there*".

Given BIG-B's position as an established player in mainstream financial services, it is not surprising that, in the use cases they engage with, the original blockchain protocol is adapted to suit the context of large-scale enterprises. Similar to what we have seen in the case of FIN-B, the transparency and public accessibility of data on the blockchain are compromised to prioritize the privacy of transaction participants. When discussing a trade finance use-case, a blockchain expert from BIG-B explains: "*This is a private, permissioned blockchain, so it wouldn't be like bitcoin totally open to everybody, because obviously if you look at when this scales, people won't necessarily want the public to know what has been transferred*".

The privacy requirement here is associated again with the prospects of scalability of this application to the level suitable and appealing to

large corporations. However, some aspects of the original protocol are retained and considered as foundational. An interviewee from BIG-B's blockchain experimentation team confirms: "*Immutability is arguably one of the foundational cornerstones of why distributed ledger technology is so interesting. I think* [*big tech company*] *had a press release where they patented editable blockchains. This raised a lot of eyebrows because it contradicts exactly why you'd want to use a blockchain*".

BIG-B, have invested in several use cases, where they are still exploring various adaptations of the original blockchain protocol. For example, one of our interviewees mentioned a cryptocurrency network that is even more private as it uses zero knowledge proofs and offers an alternative transparency-privacy balance in its design. He explains: "*You can do something without actually knowing who the person is, to add an extra amount of privacy to it. There are business use cases to it, there are different transactions or deals that you might do, that you don't want the other party to know. From an investment banking perspective you might have heard of things like 'dark pools' and types of trading that is done where banks don't necessarily know which other banks they are trading with because you would be able to understand what sort of position they are taking in the market so you don't want them to know that.*".

4.2.2. Blockchain pioneer or "fear of missing out"

Back when BIG-B first showed interest in blockchain, the technology was very much synonymous to bitcoin, which was considered as controversial and possibly illegal. This made it less attractive to banks who were reluctant to 'touch it' from a compliance point of view. An interviewee from BIG-B's blockchain experimentation team explains: "*Banks have very strict regulations around what areas they can interact with, and there are certain countries where we are not allowed to have any financing from a UK standpoint; and with the way bitcoin is designed, you are less able to track where these transactions have come from and where they go and you could get hit with a very big fine*".

However BIG-B was one of the first banks to start actively decoupling blockchain from bitcoin and among the first to engage with fintechs as clients, by providing them with bank accounts. Although this may suggest a well-established trust in the technology, more critical views from broader industry actors suggest that this might be due to a fear of missing out. A blockchain expert (non-BIG-B) explains: "*…there was so much hype about* [*bitcoin, blockchain*] *a few years ago that banks felt this obligation to have a blockchain arm, or a bitcoin department, or throw some kind of money at it. Not necessarily because they believe that there is any future for this thing, but just because there is a little bit of fear of missing out. And also, they had to be paying lip service to what was going on in some kind of way*".

4.2.3. Mobilizing external market forces and engaging with fintechs

BIG-B's strengths in the blockchain space were: a) a good understanding of the regulatory and compliance environment in financial services; b) ample financial resources; and c) access to and influence over established networks in the financial services industry. These allowed BIG-B to mobilize external forces by setting up annual "accelerator programmes" in different locations around the world and engage with fintech startups. An interviewee from BIG-B's blockchain experimentation team explains: "*Over the course of the year there's scouting, there's applications, we basically assess business interest, what areas have we seen that might be interesting, then we look at the startup environment. It's a big application process, we put 10 startups through a 13-week accelerator programme at each location*".

Accelerator programmes give rise to various use-cases, which then BIG-B evaluates and selects to support financially and sign contracts with the startups offering them. The criteria for selection are whether use-cases fit with BIG-B's business needs and with the portfolio of use-cases they have identified internally. A BIG-B interviewee explains: "*We look at startups as: 'What is the business need for us'*". However, apart from aligning startup offerings with own business needs, BIG-B also use startups to develop technical expertise on blockchain necessary to further navigate the startup environment and evaluate the various options offered by fintechs. A BIG-B interviewee, when talking about the startup environment, said: "'*What technology is out there?*' [*Interacting with fintechs*] *is about gaining a deep understanding of the technology and an understanding of the differences between the various platforms out there*".

Alongside startup accelerator programmes BIG-B also forms consortia and collaborations with other big banks. The main reason for this is to promote the widespread diffusion of blockchain across the sector. An interviewee from BIG-B's blockchain experimentation team explains: "*A consortium of banks came together, of which BIG-B was one of the founding members. People in various different banks started to notice that the technology is only really going to take off if it's adopted widely. It's not something that can just be internal.*". Industry consortia also allow BIG-B to participate in the interpretation of technology in certain industrial contexts and influence setting industry-level requirements for blockchain use. A BIG-B interviewee explains: "*The whole idea* [*of the consortium*] *is to get the banks around a table to understand what are our needs, what needs to be developed and how will we build ledgers that we can benefit from, things like reducing costs, reducing data reconciliation issues, and things like that.*". Finally, BIG-B is actively seeking to influence the regulatory framework for blockchain across the sector on a global scale by participating in expert groups that influence policy and draft bespoke rules needed for every new use of blockchain. For instance, BIG-B senior leaders sit on EU expert groups on financial innovation regulations. BIG-B, therefore, do not only require blockchain expertise for the purposes of selecting and adopting use cases that serve their own individual business needs; they also use that knowledge to navigate the startup environment, the regulatory space, and influence blockchain innovation and its diffusion across the sector more broadly.

In summary, BIG-B started exploring blockchain as an adopter, likely driven from a fear of missing out. Their role, however, extends beyond addressing their own business needs. They engage with startups in order to absorb expertise that would allow them to navigate the fintech ecosystem and to influence blockchain's mass adoption and acceptance across the sector.

5. Discussion

5.1. Protocol adaptations and re-writing trust expectations from blockchain use

In both cases we examined, findings showed adaptations of the original blockchain protocol to the business requirements of the big banks in relevant use cases. Overall, transferring blockchain from the world of crypto to mainstream financial services seems to require a shift from full transparency of the public blockchain, to introducing layers of transparency by making data selectively available to participants of specific transactions in private sub-chains. As this happens, we see the constitutive expectations of trust shift from needing fully visible transaction information and records, afforded by the original blockchain protocol, to a focus on privacy and security with scalability also discussed as a practical problem that would allow blockchain's widespread adoption and diffusion. Indeed, although the expectations of transparency and immutability are carried over to the new mainstream business settings, they are re-interpreted and contextualized within a private setting of blockchain use. The understanding of transparency, specifically, is shifting from being understood as a 'grand spectacle' where everything is visible to anyone, into a 'range of visibilities' (Larkin, 2013) made available on-demand, depending on the privacy and security requirements of participating actors. Even the immutability of blockchain, often hailed as a foundational trait of the original protocol that guarantees a 'single truth' for market participants (Beck et al., 2018; Nærland et al., 2017), narrows in scope into the private network of participants engaged in individual transactions.

A generalization of the new trust expectations would mean that blockchain could over time reach infrastructure status, involving

elements visible to users during and after transactions, and elements hidden in the background (Star and Ruhleder, 1996). As this happens, background expectations of trust will start gaining importance and trust will be produced without the need for participants to explicitly review transaction rules. Instead, they would trust that this is "how things are done" (Zucker, 1986). With regards to transparency, therefore, whereas in individual transactions it means visibility (either full or as a range) – see for example the FIN-B use case on interbank payments and how interviewees problematized existing condition as lacking transparency, thus requesting more visibility and traceability in transactions – a generalized version of it onto a blockchain infrastructure could mean invisibility. In infrastructure studies, an infrastructure is considered transparent when it sinks into an invisible background and being taken for granted by its users and it becomes visible only in moments of breakdown (Star and Ruhleder, 1996). As Star (2002) confesses: "*I think of how long it took me to learn the meaning of 'transparent' when I was a newbie stranger to the world of computer science, coming as I did from interpretive sociology. It really means opaque!*" (p: 112).

Overall, we are able to observe an emerging innovation trajectory involving the mutual shaping between technical design adaptations of the blockchain protocol and expectations of trust. As shown in Table 4, from transparency as full visibility during transactions in the original blockchain protocol, we move to a layered transparency which allows a range of visibilities as blockchain is considered for use in mainstream markets. Finally, on a theoretical level at least, we may suggest a further move towards a potential invisibility if and when blockchain over time becomes an information infrastructure where trust expectations would be black-boxed (Latour, 1999),[2] and taken-for-granted by market participants.

5.2. Role of fintechs and big banks

Fintechs and big banks balance transparency requirements and re-write constitutive expectations during use-case design choices. This does not happen in a vacuum but in the context of an emerging marketplace for use cases as early blockchain commodities. As blockchain is decoupled from bitcoin and considered for mainstream corporate settings, there is a rush for such use-cases which represent flexible, discursive and material adaptations of the original blockchain protocol.

Table 4
Blockchain innovation trajectory: protocol adaptations and changing trust expectations.

Blockchain	Technical affordances	Trust expectations
Original protocol	Transparency, immutability	Full visibility (constitutive)
↓		
Adapted to mainstream markets	Layered (on-demand) transparency	Range of visibilities for privacy & security (constitutive)
↓		
Generalized beyond single transactions	Transparency of blockchain infrastructure	Invisibility, taken-for-grantedness (background)

[2] Latour associates invisibility with success of a technology. Indeed, the more a technology is settled and runs efficiently and is accepted as successful by its users, the more opaque it becomes (Latour, 1999).

They are comprised by a) *discourse*, namely an idea introducing the technology and making it palatable to mainstream players (Brekke, 2019); b) a *platform design* outlining how the blockchain protocol interacts with the business application context (Rossi et al., 2019); and c) *ambiguity*, in the sense that use-cases are not finalized solutions but rather invitations for experimentation and negotiation between actors (Gomber et al., 2018). It is in the context of these negotiations over design choices (Rossi et al., 2019) between fintechs and big banks that the shift in trust expectations from full to a range of visibilities takes place, as described in the previous section.

Apart from designing trust expectations into blockchain use cases, banks and fintechs also look into generalizing trust expectations across the sector. The reason is that they are looking for strategic benefits from their blockchain involvements and influential positions within the emerging blockchain marketplace. FIN-B, for example, positioned themselves as idea entrepreneurs (Abrahamson and Fairchild, 1999) on the supply side, targeting big banks as their potential clients pitching to them innovative ideas and visions. What makes this possible for FIN-B is their technical expertise on distributed ledger technology, an agile development culture and a risk-seeking attitude. Besides securing large big banks as clients, they are also after their financial resources, their industry and regulatory influence as a getaway to scalability and mass adoption towards establishing a taken-for-granted blockchain infrastructure.

Big banks, on the other hand, although initially appear as blockchain adopters who explore its promises out of fear of missing out, ambitious ones like BIG-B move beyond an adopter role and seek to re-define themselves as influential industry leaders and technology champions. In absence of an established supply of blockchain expertise, BIG-B opens up to the fintechs, i.e. through accelerator programmes, and selectively 'cannibalize' (Fincham et al., 1994) their technical expertise. Such expertise allows them to gain a better understanding of how to scout, evaluate and select use-cases from the fintech ecosystem and to position themselves ahead of other powerful actors as influential players actively shaping blockchain generalization. Big banks and fintechs, therefore, do not compete in a race of providing more efficient financial services to their customers; instead, they become co-dependent in the emerging blockchain marketplace: Fintechs constitute a resource for blockchain expertise that big banks utilize to manipulate sector boundaries and position themselves as powerful influential players, whereas big banks constitute for fintechs a gateway to blockchain mass adoption and entrepreneurial success.

6. Conclusions

In this paper we explore the role of a fintech and a big bank in shaping trust expectations from blockchain use as the technology is adapted for use in mainstream corporate settings in the financial services sector. Our analysis reveals a notable shift in trust expectations – transitioning from full visibility of transaction information to embracing a range of visibilities. This shift is a response to the adaptation of the blockchain protocol, introducing layered transparency to address the privacy and security concerns of mainstream users.

The study highlights that fintech firms and big banks wield considerable influence in re-writing constitutive expectations of trust. At the same time, these key actors, strategically position themselves – fintechs as suppliers of innovative ideas and expertise and big banks as adopters and resourceful champions in the burgeoning blockchain marketplace.

In addition to re-shaping trust dynamics these key players contribute to the broader generalization of trust expectations from blockchain use. This extends beyond isolated transaction events to foster a perception of blockchain as a taken-for-granted infrastructure. For example, they introduce, select and pursue promises and organizing visions related to blockchain, exemplified through relevant use cases. Subsequently, by interpreting these ideas and mobilizing financial resources, market forces and industry influence, they seek to propel them on a mass scale.

6.1. Contributions

In this study we have identified a research gap in relation to the ways in which trust expectations from blockchain use may change when it is adapted for use in mainstream business settings, and the role of two key actors (banks and fintechs) in this process. We devised two research questions to specifically address this research gap. Below we present our analysis' contributions to theory and industrial practice.

6.1.1. Theoretical contribution: blockchain innovation trajectory

Our analysis leverages Zucker's theory of trust as constitutive and background expectations of participants in a market exchange. By examining how these expectations change alongside adaptations of a technology in a new business context, we contribute to the theoretical understanding of the coevolution between technological change and trust expectations. Specifically, we identify an innovation trajectory between changes in blockchain technology (i.e. from full to layered transparency in the blockchain protocol) and trust expectations from its use (i.e. from full visibility to a range of visibilities), as blockchain is disentangled from associations with cryptocurrencies and reinvented as a mainstream technology for financial services. We suggest that looking forward, and if blockchain achieves infrastructure status, generalized background trust expectations will become more prevalent, while the meaning of transparency will shift from "visible" to "opaque" during transactions as constitutive expectations become less needed.

6.1.2. Implications for practice: navigating the emerging blockchain marketplace

Our analysis suggests the emergence of a marketplace for trust expectations embodied in blockchain use cases. It is in this context that the big bank-fintechs relationship can be understood. Indeed, these two key actors enter and strategically position themselves within this marketplace as influential players while negotiating the technology and redefine trust expectations from its use. We showed, for example, how FIN-B and BIG-B position themselves in co-dependent relationships as suppliers/experts and adopters/influential actors respectively. Industry practitioners, startups or established players, must understand the dynamic shaping the technology-trust relationship and the strategic co-dependencies between important actors. This will help them navigate the blockchain use case marketplace, influence its boundaries, access and mobilize resources to pursue their strategic plans.

6.2. Limitations and future work

Two main limitations have been identified, one concerning the spatial scope and the other related to the temporal dimension of our research design. In terms of spatial aspects, our study focuses on the roles and relations between two specific types of industry actors active in the blockchain space, fintechs and big banks. While this choice was guided by the emergent literature on the subject, we acknowledge that it represents only a specific segment of the broader industry landscape engaged in blockchain innovation. Other pivotal actors, such as regulators, national governments, professional groups wield significant influence and merit further exploration in future research endeavors. Turning to the temporal aspects of our research design, it is important to acknowledge that the data we collected from 2016 to 2019 capture a mere snapshot of the nascent developments in blockchain technology. While the data gleaned from this timeframe accurately reflect the context at the time, the rapid pace of evolution inherent in emerging technologies and the volatile shifts in the strategic trajectories of industry players might raise questions about the continued relevance of empirical data of the course of a few years. Despite this concern, we contend that these snapshots offer a distinct vantage point for future research ventures, affording insights into the early phases of blockchain commoditization and the driving forces behinds its integration into the intricate information infrastructure of the financial system. Future studies tracing further the evolution of trust expectations as the technology becomes widely adopted to an infrastructure level, would add value to our understanding of the relationship between technological change and trust expectations.

CRediT authorship contribution statement

Antonios Kaniadakis: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Paige Foster:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Validation.

Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.

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