Clingendael Institute

Blockchain for fragile states:: the good, the bad and the ugly

Author(s): Willem van den Berg

Clingendael Institute (2018)

Stable URL: http://www.jstor.com/stable/resrep17341

FEBRUARY 2018

Blockchain for fragile states: the good, the bad and the ugly

Willem van den Berg

Proponents of blockchain technology, the technology behind cryptocurrencies such as Bitcoin, argue that it can lower transaction costs and increase trust. Since fragile states are often characterized by high transaction costs and low trust, many organizations are looking at blockchain applications in these contexts. This Policy Brief highlights three areas where aid and development organizations are experimenting with blockchain technology in fragile states: remittances and banking, supply chain transparency, and land registration. It also looks at the topic with a conflict sensitive lens and examines the technical and political challenges and risks for wider adoption.

Introduction

In 2008, amidst the height of the financial crisis, an anonymous person or group of people called Satoshi Nakamoto released a white-paper called "Bitcoin: A Peer to Peer Electronic Cash System."[1] One innovation of the paper was a technique to record digital transactions in a way that was publically available, verifiable, and permanent, in a distributed database that did not rely on a trusted third party. This technique came to be known as blockchain, sometimes referred to as distributed ledger technology. Although blockchain is best known for its role in cryptocurrencies such as bitcoin, its proponents claim that it can increase transparency and lower the transaction costs in almost any domain: from royalty distribution in the music industry, to birth certificates and voting.[2] International development is one area that is particularly appealing to blockchain enthusiasts, as one of bitcoin's initial use cases was thought to be fast and low-cost remittances.[3] Today there is largescale blockchain experimentation ongoing in the international development community, from small start-ups seeking to disrupt the remittance

---

1   The original white paper can be found at: https://bitcoin.org/bitcoin.pdf.

2   Tapscott, Don & Tapscott, Alex. (2016). "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World." Penguin Random House: New York.

3   *CCN* (15 December, 2013). "Bitcoin As A Medium Of Exchange: Domestic Remittances Use Case." https://www.ccn.com/domestic-remittances-international-remittances-will-highlight-bitcoins-superiority-medium-exchange/; As bitcoin has scaled, its higher transaction fees and volatility have made it unsuitable for remittances.

industry[4] to the United Nations' World Food Programme, which used the Ethereum blockchain in mid-2017 to distribute aid to 10,000 Syrian Refugees in Jordan.[5]

Within international development, contexts of fragility provide an interesting test case for blockchain because they often combine dysfunctional governance structures with digitally savvy populations. This Policy Brief will examine the possible ways in which blockchain technology can be applied to address three specific issues encountered in fragile states: remittances, supply chain transparency, and land rights. The Policy Brief will briefly highlight the ways in which the technology is already being piloted and at the main challenges and risks for wider adoption: technological and political. With so many aid and development organizations experimenting with blockchain, it is a good time to start exploring the topic for fragile states from a conflict sensitive lens.

Blockchain's potential for fragile states

In today's digital world millions of transactions are made online each day, with most of these transactions recorded digitally in only one or two databases, called centralized ledgers. The problem with digital records stored in centralized ledgers is that they can easily be tampered with: for example, transactions can easily be changed, duplicated, or even deleted. As a consequence, trust in the parties that keep the ledgers is required; these are often intermediaries who charge lucrative fees for their services. Blockchain technology addresses this issue by using cryptography and a peer-to-peer network of computers to create a digital history that is publically available, verifiable, and permanent.[6] Blockchain is a distributed ledger. Blockchain has been called a "trust machine," because it removes the trust required of the intermediaries; the ledger is not centralized in one party but its parts are distributed and synchronized over many users.[7] Since it upends the foundational process of recordkeeping, blockchain has the potential to disrupt large parts of the economy.

Fragile states are interesting for blockchain technology because they are usually characterized by high transaction costs and low trust, issues that blockchain could address. In this sense, using blockchain in fragile states is a continuation of existing thinking of lowering transaction costs and increasing trust. Blockchain technology could be appealing in these contexts because modern fragility combines dysfunctional governance with often high levels of technological adoption. For example, during Somalia's decade's long civil war it developed high mobile phone coverage and some of the lowest telecom costs in Africa.[8]

---

4   Hynes, Casey (15 September, 2017). "Meet The Cryptocurrency Startups Targeting The $26 Billion Remittance Industry In The Philippines." https://www.forbes.com/sites/chynes/2017/09/15/meet-the-cryptocurrency-startups-targeting-the-26-billion-remittance-industry-in-the-philippines/#384bb8e35510.

5   *World Food Program.* (30 May, 2017). "Blockchain Against Hunger: Harnessing Technology In Support Of Syrian Refugees." https://www.wfp.org/news/news-release/blockchain-against-hunger-harnessing-technology-support-syrian-refugees.

6   For a more elaborate explanation see: *CB Insights* (November 21, 2017). "What Is Blockchain Technology?" https://www.cbinsights.com/research/what-is-blockchain-technology/?utm_source=CB+Insights+Newsletter&utm_campaign=cf712a6f19-TuesNL_12_19_2017&utm_medium=email&utm_term=0_9dc0513989-cf712a6f19-88571809; it is important to note that there are different types of blockchains, some of which are not publically available.

7   *The Economist* (October 31, 2015). "The promise of the blockchain: The trust machine." https://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine.

8   Winter, Joseph (19 November, 2004). "Telecoms thriving in lawless Somalia." *BBC.* http://news.bbc.co.uk/2/hi/africa/4020259.stm; Onyulo, Tony (26 February, 2016). More phones, few banks and years of instability are transforming Somalia to a cashless society." *Quartz.* https://qz.com/625258/more-phones-few-banks-and-years-of-instability-are-transforming-somalia-to-a-cashless-society/.

All across the world countries that have weak state capacity and legitimacy have populations that are increasingly digitally active, frequently having leapfrogged traditional technologies like landlines to go straight to mobile phones. Today, even the most war-torn parts of Syria and Yemen have active Twitter users uploading photos of the conflict.[9] Although blockchain applications have been proposed for a host of issues in fragile states, three of the most talked about areas are remittances, supply chain transparency, and land registration.

Remittances and banking

Around two billion people around the world are unbanked, having no access to formal financial services.[10] Most of these people live in developing countries, many of them in fragile states. These countries lack the infrastructure for widespread formal financial services. The poorest customers are also unprofitable for commercial banks. Additionally, remittances are sent from workers in high income countries to developing countries, often to unbanked relatives. In 2016 around USD 430 billion was sent as remittances, a figure that is almost three times global Official Development Aid.[11] These remittances are costly to send and can sometimes take days before the money has been transferred. On average, sending USD 200 worth of remittances around the world costs 7.4%, although it is more expensive to send to regions like sub-

Saharan Africa.[12] Western Union, which has a popular remittance service, charges almost 10%, a substantial fee for the world's poorest. Several systems have developed to address these dual problems, including *hawala*, a trust-based system of brokers who transfer money without actually moving any money, which is popular in the Horn of Africa.

Many people believe that cryptocurrencies running on blockchain technology can solve these problems more effectively. The idea is that a freely downloadable app on a smartphone can turn anyone into their own bank, while remittances will be able to be made in this cryptocurrency across the globe, almost instantaneously and practically free. Examples of startups that have begun experimenting in this space include BitPesa, which has begun using bitcoin and blockchain for Nigeria, Tanzania, and Uganda.[13] SureRemit has created its own cryptocurrency and will focus on remittances in Nigeria, Kenya, and Rwanda.[14] Although not exactly remittances, in mid-2017 the UN World Food Programme began a pilot programme in Jordan's Azraq refugee camp, allowing refugees to "pay for their food by means of entitlements recorded on a blockchain-based computing platform" (a de facto cryptocurrency).[15]

Although cryptocurrencies are already being piloted in fragile contexts, several significant challenges remain. Internet coverage and smartphone adoption rates are not yet universal. Cryptocurrencies may be useful to some in fragile states,

9   Mohdin, Aamna (13 December 2016). "The slaughter of Aleppo is being recorded in real time on Twitter, by its own victims." *Quartz*. https://qz.com/861710/the-slaughter-of-aleppo-is-being-recorded-in-real-time-on-twitter-by-its-own-victims/.

10 Asktrakhan, Irina (17 May, 2016). "2 billion people worldwide are unbanked – here's how to change this." *World Economic Forum*. https://www.weforum.org/agenda/2016/05/2-billion-people-worldwide-are-unbanked-heres-how-to-change-this.

11 Pisa, Michael & Juden, Matt (2017). "Blockchain and Economic Development: Hype vs. Reality." *Center for Global Development*. CGD Policy Paper 107, July 2017. p. 16.

12 *Ibid*.

13 See: https://www.bitpesa.co/.

14 See: https://sureremit.co/; Bright, Jake. (11 December 2017). "Africa's SureRemit joins the tokenized race to win the global remittance market." *Techcrunch*. https://techcrunch.com/2017/12/11/africas-sureremit-joins-the-tokenized-race-to-win-the-global-remittance-market/.

15 *World Food Program*. (30 May, 2017). "Blockchain Against Hunger: Harnessing Technology In Support Of Syrian Refugees." https://www.wfp.org/news/news-release/blockchain-against-hunger-harnessing-technology-support-syrian-refugees.

but the world's truly poorest do not have the access to nor the technological literacy to use the technology yet. The technology itself also has several crucial constraints. Although bitcoin was touted as useful for remittances in its early days, as it has scaled it has become slow, transactions have become exorbitantly expensive, and the network uses an obscene amount of electricity.[16] Some other cryptocurrencies run on different protocols that make them faster and cheaper, but there is still a discrepancy between the technological hype and the reality. Additionally, cryptocurrencies are not widely-accepted as currency anywhere in the world, and the extreme volatility of most cryptocurrencies, which regularly go up or down by more than 20% of their value per day, make them too risky to use in any consistent way.

All of these challenges may have technical solutions. But there are also political challenges and risks: many governments around the world have been highly critical of cryptocurrencies. On the one hand, the current lack of regulation and pseudonymous nature of cryptocurrencies make them tempting for criminals who want to avoid government oversight. On the other hand, if they achieve widescale adoption they may threaten a government's control over its own monetary supply. This could lead to outright banning, heavy regulation (which could erase some of the advantages of cryptocurrencies), or in the context of fragile states and depending on the protocol of the particular cryptocurrency, some form of co-option of the cryptocurrency by the ruling elite.

Supply chain transparency

A second area were blockchain could make a difference in fragile states is supply chain transparency. When sourcing materials from fragile states it is sometimes difficult to know where the materials come

from and whether conflict or coercion was involved in the supply chain. Many companies and consumers are aware of this risk and are reluctant to buy what may be blood diamonds or other conflict minerals. However, there is often little transparency in mineral supply chains and it is easy to conceal the nature of conflict minerals, not least when there are multiple private ledgers that are easily tampered with.

Blockchain advocates propose that with a distributed ledger that cannot be altered, transparency and traceability is increased and no single entity can conceal conflict minerals with a single click in their database. Companies and consumers will then have more confidence that their materials are not involved in a violent supply chain. Blockchain solutions for supply chain transparency are already being offered by large companies such as IBM, as well as smaller startups.[17] Peer Ledger, a small company founded in 2016, has developed software called Mimosi, specifically for tracing the supply chains of precious and industrial metals in countries like the Democratic Republic of Congo. Mimosi uses blockchain technology to provide assurance that buyers are "buying precious and industrial metals from ethical sources to the best of their knowledge."[18] Although it may be hard to imagine hundreds of artisanal miners in places like the Democratic Republic of Congo using mobile phones to upload details of their bags of cobalt to the blockchain, this exact scheme will be piloted in 2018.[19]

This application of blockchain also faces several challenges and risks. Firstly, most issues of supply chain transparency and traceability in these contexts stem from bag tampering or false data entry, not from

---

16 Popper, Nathaniel. (21 January, 2018). "There Is Nothing Virtual About Bitcoin's Energy Appetite." *New York Times.* https://www.nytimes.com/2018/01/21/technology/bitcoin-mining-energy-consumption.html.

17 Dickson, Ben. (24 November, 2016). "Blockchain has the potential to revolutionize the supply chain." *Techcrunch.* https://techcrunch.com/2016/11/24/blockchain-has-the-potential-to-revolutionize-the-supply-chain/.

18 See: http://mimosi.peerledger.com/.

19 Lewis, Barbara (2 February, 2018). "Blockchain to track Congo's cobalt from mine to mobile ." *Thomson Reuters Foundation.* http://news.trust.org/item/20180202084223-0if64/.

tampering with data retroactively. Blockchain still relies on local humans to input the data, who can simply lie or are vulnerable to bribes – a problem already faced in current supply chain monitoring. Perhaps a more pernicious problem is that in many fragile states corruption is endemic and transparency could be against the interests of powerful actors within the supply chain. Widescale adoption of this technique will be difficult in settings of fragility, where corruption and conflict are often the sources of political and commercial power on many levels. It seems unlikely that blockchain technology will be embraced in these contexts, or that it will quickly improve transparency.[20] One possible scenario is that blockchain technology proves useful and popular in the transparency of supply chains elsewhere, and that subsequently a lack of adoption of it in fragile states may become a red flag to some consumers to avoid products sourced from those areas. However, this boycott would not directly improve the actual plight of miners within conflict supply chains, and in the short run would hurt their livelihoods.

Land registration

A final issue that is often mentioned as an application for blockchain technology in developing countries (and sometimes fragile states) is ownership rights and registration. Land and housing are the most important assets of the poor, and yet their ownership is often disputed. Key documents and archives, if they were even there in the first place, can easily be stolen, misplaced, destroyed, or tampered with. When ownership of assets is difficult to trace and prove this can lead to conflict and entitlement disputes, as well as underdevelopment due to what economist Hernando de Soto calls "dead capital."[21]

Advocates of blockchain technology, including de Soto himself, argue that putting registration onto a blockchain will address these issues: it could make the land registration available to millions of people in a way that is permanent, transparent, corruption-proof, and faster and cheaper than traditional registration. De Soto is working with the blockchain technology company Bitfury and the government of Georgia to pilot a blockchain land-titling project.[22] Other governments, including Ukraine, Ghana, and some states in India, have also begun looking into piloting blockchain for land registration.[23]

Here too there are challenges and risks. An important limitation is that control over land can be a conflict driver even when the official ownership is clear, a problem blockchain cannot address. But disputed ownership itself is also more than simply a problem of record keeping and bad administration, it is a political problem. Land usually has a de facto owner even when this is not recorded in the official registry. Whether the registry is decentralized does not solve the current problem, although it may prevent future ones. Blockchain technology provides no specific tool to address the current disconnect between who lives on the land and what is officially recorded, especially when multiple parties claim to own the same piece of land. Moreover, the nature of the government will be crucial in the success of blockchain land registration. Using blockchain to make ownership more transparent and tamper-proof may work in settings where the government is trustworthy and can back-up the ownership rights. But many fragile states have governments that lack this trust and capacity. These governments may not be able to enforce the ownership rights which will

---

20 Coca, Nithin. (31 July, 2017). "Technology is failing to create transparent supply chains." *Endgaget*. https://www.engadget.com/2017/07/31/technology-supply-chain-transparency/.

21 Scott, Michael. (10 April, 2017). "Blockchain Proponent and Economist Hernando de Soto Honored With Global Award." *Bitcoin Magazine*. https://bitcoinmagazine.com/articles/blockchain-proponent-and-economist-hernando-de-soto-honored-global-award/.

22 Prisco, Giulio. (8 February, 2017). "Bitfury, Republic of Georgia Push Ahead With Blockchain Land-Titling Project." *Bitcoin Magazine*. https://bitcoinmagazine.com/articles/bitfury-republic-georgia-push-ahead-blockchain-land-titling-project/.

23 *Osborne, Clarke*. (28 September 2017). "Blockchain and land registries: records of the future?" http://www.osborneclarke.com/insights/blockchain-and-land-registries-records-of-the-future/.

5

result in disputes continuing to play out at a local level. In extreme cases, the government could even use the process of moving land registration onto a blockchain as a ploy to redistribute unregistered land within their own patronage networks.

Conclusion

Conceptually, blockchain technology can address several difficult issues faced in contexts of fragility, but this relies on both the technical capacity of the specific blockchain and a willingness of multiple parties in those fragile states to adopt the new technique, the difficulty of which are easily underestimated. Developers are working on solving technical issues, but in contexts of fragility the politics behind adoption are every bit as important as the technology itself. If blockchain technology does become widely adopted, perhaps first in low-income but stable countries before moving on to fragile states, the accompanying political economy issues mentioned above will become extremely important. Although it has been ten years since blockchain was first conceptualized and the real world applications remain limited,[24] the hype surrounding the technology has gained enormous traction within the international development community. Many early adopters are already testing the waters with pilot projects as this is an exciting field with potentially significant implications for fragile states.

---

24 Stinchcombe, Kai (December 22, 2017). "Ten years in, nobody has come up with a use for blockchain." *Hackernoon*. https://hackernoon.com/ten-years-in-nobody-has-come-up-with-a-use-case-for-blockchain-ee98c180100 ; For a full length critique of the usability of blockchain see: Gerard, David (2017). "Attack of the 50 Foot Blockchain."

About the author

Willem van den Berg works for Clingendael's Conflict Research Unit
as a research assistant for the Business and Fragility Programme.