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**Working Paper**

## How can cryptocurrency and blockchain technology play a role in building social and solidarity finance?

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# UNRISD

United Nations Research Institute for Social Development

Working Paper 2016-1

## **How Can Cryptocurrency and Blockchain Technology Play a Role in Building Social and Solidarity Finance?**

*Brett Scott*

prepared for the UNRISD Workshop  
Social and Solidarity Finance: Tensions, Opportunities and  
Transformative Potential” in collaboration with the Friedrich-Ebert  
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## Abstract

The decentralized digital currency Bitcoin—and its underlying “blockchain” technology—has created much excitement in the technology community, but its potential for building truly empowering social and solidarity-based finance has yet to be tested. This paper provides a primer on the basics of Bitcoin and discusses the existent narratives about the technology’s potential to facilitate remittances, financial inclusion, cooperative structures and even micro-insurance systems. It also flags up potential points of concern and conflict; such as the tech-from-above “solutionism” and conservative libertarian political dynamics of some of the technology start-up community that surrounds Bitcoin. As a way of contrast the paper considers “blockchain 2.0” technologies with more overtly communitarian ideals and their potential for creating “cooperation at scale”. It concludes with suggestions for future research.

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## Acronyms

<b>DAO</b>	Decentralized autonomous organizations
<b>ICT4D</b>	Information and Communication Technology for Development
<b>IT</b>	Information technology
<b>PIN</b>	Personal identification number
<b>SSF</b>	Social and solidarity finance
<b>UNRISD</b>	United Nations Research Institute for Social Development
<b>US</b>	United States

## Introduction

The rise of Bitcoin has been ambivalently received by many in international development circles. The cryptocurrency is based on collaborative open source principles and peer-to-peer networks that suggest a commitment to social solidarity and mutual aid, but Bitcoin's image has become associated with speculators, profit-driven entrepreneurs, market-fundamentalist libertarians and technology fetishists (Yelowitz and Wilson 2015). The “scene” or community around Bitcoin seemingly has little connection to the gritty social reality of many in poorer countries. The frequently aggressive rhetoric within the community, as well as the inequality of access and wealth within the system, seems—at first glance—to clash with the ideals of those in social and collaborative economy movements.

Despite this, the question of whether Bitcoin can be harnessed to empower marginalized communities and build new means of solidarity-based finance remains unanswered. This paper sketches out the contours of some key issues that social and solidarity finance practitioners should consider when thinking about cryptocurrency technology. It is intended to provide a primer on the basics of Bitcoin, and to flag up existent narratives on the technology's potentials and limits.

First, it considers claims made by Bitcoin proponents concerning the positive role Bitcoin can play as a tool of financial inclusion, or as a tool to build new systems of property rights in countries with unstable governance. It also considers technical and political critiques of these claims.

Second, the paper looks at the attempts to design new cryptocurrencies—such as Faircoin—based on explicitly cooperative and social justice principles.

Third, the paper considers the emergent wave of “blockchain 2.0” innovation, in which the underlying “blockchain” technology of Bitcoin is expanded into realms like share issuance and micro-insurance. The original Bitcoin community made much out of the “trustless” nature of the technology (Miscione and Kavanagh 2015)—the fact that it does not rely on trusted central intermediaries—but newer groups are expanding the vision into one of trust-enabling decentralized cooperatives, or “distributed collaborative organizations”.

## A Primer on Cryptocurrency

To understand the Bitcoin system, it is useful to sketch out the similarities and differences with the normal bank-run electronic payments system. In the normal system:

1. A person has an account number at a bank.
2. They have a way of proving that they control that account number—for example, a PIN code.
3. The bank, in turn, has a data record of how much money is attributable to that account number, thereby keeping score of the person's money on a private internal database or ledger.
4. The person can then use an electronic communications system to identify themselves to their bank as the authentic account holder, and can request for the money associated with their account number be transferred to someone else's account at a different bank.

5. This then spurs the bank to edit their ledger of accounts—changing the person’s score—and to tell the recipient’s bank to do the same. The process is a little more complex than this, but in effect the money moves via a series of private databases being edited.

The normal bank payments system thus works by a limited set of private intermediaries editing private databases that they control, and then informing the account holders that the transactions have occurred (e.g. “Your new balance, recorded in our datacentres, is £1,240”).

The Bitcoin system—like the normal bank payments system—is intended to move monetary tokens between people through the changing of account entries on databases, but it has two immediate differences. First, the database that is used to record payments between people is public, rather than the privately held account databases of the normal banking system. Second, the intermediaries that change that database are a decentralized network of people (“miners”) running special Bitcoin software, rather than banks running their own private software systems.<sup>1</sup>

Thus, the Bitcoin system, at its most simple, consists of a widely distributed, and highly visible, public ledger (or database)—colloquially referred to as the blockchain—that people can use to record transactions of digital tokens between themselves. The database thus keeps score of their tokens on the system in a highly public and transparent<sup>2</sup> way.

In the Bitcoin system:

1. A person wishing to make a payment has a public address (akin to an account number).
2. They have a way of controlling that public address through the use of a private key (roughly akin to a PIN number)
3. They then use an electronic communications system (the internet) to identify themselves to the Bitcoin network, and request that digital tokens—associated with their public address—be moved to someone else’s public address.
4. This then occurs by a change made to the blockchain ledger by a set of participants colloquially known as miners.<sup>3</sup> It is beyond the scope of this paper to describe the exact means by which this happens, but the process involves the miners using their computing power to validate the transactions.
5. The two parties who control the public addresses can then see these changes, proving that the tokens have moved from one address to the other.

### ***The nature, stability and security of Bitcoin tokens***

Note that all the Bitcoin system actually does is enable digital tokens to be moved between participants, with the help of miners who volunteer their computer power to move the tokens around. Whether such digital tokens are perceived to have value or not

<sup>1</sup> For a detailed technical description of the Bitcoin system, see Antonopoulos 2014.

<sup>2</sup> Much media attention on Bitcoin has focused on the fact that people can anonymously transact using the system, which seems to run counter to the claim of transparency. Note though, that the means by which such anonymous transactions are achieved is through the use of a highly transparent public ledger. All transactions on the system can be seen by everyone, but attributing a specific person’s identity to any particular transaction is difficult.

<sup>3</sup> These miners can be thought about as a decentralized network of clerks who check to see that participants actually have the funds they claim to have, and who then record a change to the decentralized blockchain ledger. In a bank, the same task would be undertaken by checking to see that someone’s account balance had enough in it to make a payment, and then changing their balance to make that payment.

is a separate, and more complex, issue. Some of the first questions that have been asked about bitcoins are:

- What is the nature of these tokens? Are they money? Where does their value come from?
- Is this perceived value stable, or prone to volatility?
- Is the system safe, or prone to hacks and fraud?

### *Is Bitcoin money?*

When addressing the first question, it is important to note that our normal money is also just tokens—whether in a digital form or in a symbolic paper or metal form—which people move around either by editing databases (electronic money) or by literally handing over the symbolic physical representation (cash). The construction of the perceived value of the euro or the yen is a historical process involving deep cultural and political dynamics.

The value of a US dollar is underpinned by enormous network effects, the fact that hundreds of millions of people implicitly agree that the tokens represent value and the fact that the tokens are deeply anchored in a vast real economy. The fact that so many people are interdependently locked into usage of such tokens makes it incredibly difficult for anyone to deny their perceived value, and if they do so they will tend to find themselves excluded from economic life. To get such tokens into such a central economic position does not come easily—it involves deep interplays between state power, central banks, commercial banks, institutions that protect property title, and the redeemability of legal tender to pay taxes and other debts—but once a monetary standard is established it is very difficult to dislodge.<sup>4</sup>

Bitcoin, by contrast to a token like the South African rand, has no geographically and politically discreet real economy in which it is dominant. It thus does not tend to be a primary unit of pricing in any economy—very few vendors explicitly price their goods in terms of Bitcoin as a unit of account—and it is also not widely perceived as a means of exchange. Thus, while it has the potential to be a currency unit, in practice few people actually use, or perceive, Bitcoin as money in a traditional sense.<sup>5</sup>

This has led some national authorities to characterize it as a digital asset rather than a currency. In this sense it bears some resemblance to gold, which similarly has ambiguity as to whether it should be perceived as an asset or as a form of money. For now, though, it suffices to say that (i) Bitcoin is a digital token that can be moved between parties, and (ii) the token has market value in terms of major national currencies (the token can be exchanged for dollars, pounds and other currencies) and (iii) it is sporadically used—albeit often in small amounts—in exchange for real world goods and services.

### *Perceived risks: Volatility and safety*

The question of what underpins Bitcoin tokens' perceived value—and the related question of its price in terms of fiat currencies—is beyond the scope of this paper.<sup>6</sup> It suffices to say for now that when Bitcoin first started it was seen by many as a mischievous, subversive, and slightly mysterious, experiment, rather than a serious

<sup>4</sup> We do see situations in which these token systems break down as a result of institutional distress, as in the case of the Zimbabwe dollar's disintegration through hyperinflation from the late 1990s.

<sup>5</sup> For discussions about whether Bitcoin is money, see Yermack 2015; Selgin 2015; Weber 2014; Lo and Wang 2014; and Bergstra and Weijland 2014.

<sup>6</sup> For more on this topic, see Cheah and Fry 2015; Polasik et al. 2015; Hayes 2015; and Ciaian et al. 2015.



commercial instrument. The digital tokens went through a fetishization process in which they began to get imbued with imagined value by a small, dedicated group of evangelists, who in turn paved the way for speculators to get involved, and for media outlets to run stories (Glaser et al. 2014). This in turn opened up the tokens' usage to more ordinary people, business owners and entrepreneurs. Today, perhaps the most we can say is that the digital tokens have a perceived value contingent upon their specialized usage among specialized communities, and that the construction of this perceived value is an ongoing process that develops as more players get involved.

One key element of this, though, is that—in contrast to locked-in state currency systems—the perceived value (as measured in terms of other currencies) has fluctuated greatly over time. This volatility creates a chicken-and-egg scenario: if more people got involved, the value of the tokens would stabilize, because the larger the user base, the less influence any one user would have in influencing the price.<sup>7</sup> But many people shy away from using Bitcoin because of the volatility.

Another perceived risk that keeps people away is the fact that the Bitcoin system has been subjected to various security breaches, mostly involving third-party services—like exchanges where you can buy bitcoins in exchange for fiat currencies—but also involving hacks of private computers where people have Bitcoin “wallets”, the software they use to interact with the system. It is important to note, however, that as the community around Bitcoin has matured and expanded, the security standards have steadily increased.<sup>8</sup> Many new markets are initially subject to cowboy or rogue operators who gradually get pushed out by more formal actors over time.

### *Regulation, tax and accounting*

Lastly, it is important to point out that within cryptocurrency scholarship and practice, there are a number of ongoing debates concerning how Bitcoin should interface with mainstream regulatory, legal and tax regimes in different jurisdictions. This includes practical questions on:

- how to tax Bitcoin transactions (including VAT and income tax);<sup>9</sup>
- how to account for Bitcoin in formal financial statements;<sup>10</sup> and
- how to regulate it: is a provider of Bitcoin services a financial services company, for example?<sup>11</sup>

All three of these strands involve a question of how to categorize Bitcoin. Taxation, accounting and regulation can shift depending on whether it is seen as a currency, an asset (or investment), a commodity or a digital service. Different countries are at different stages of advancement and sophistication in resolving these conundrums.

### ***Narratives of cryptocurrency empowerment***

Bitcoin initially rose to prominence in advanced industrial nations like the United States, and remains most widely used within such countries. Nevertheless, a discursive theme that has developed is whether Bitcoin can be applied within the context of

<sup>7</sup> This is actually a characteristic present in many new and relatively illiquid financial markets, which are initially subject to jagged price fluctuations but gradually smooth out over time as more players get involved, or as the market matures.

<sup>8</sup> Of all the academic literature on Bitcoin thus far, technical analyses of the system's security are perhaps the most prominent and numerous. To browse this literature, see <http://bit.ly/BitcoinResearch>.

<sup>9</sup> See Bal 2015.

<sup>10</sup> See Raiborn and Sivitanides 2015.

<sup>11</sup> See Levin et al. 2015; Ponsford 2015; and Tsukerman 2015.

international development, financial inclusion and bottom-of-the-pyramid business efforts. A number of narratives about why it may be empowering for people in less developed countries has emerged.<sup>12</sup> This includes:

- Bitcoin as a means to facilitate low-cost remittances for those seeking to transfer small amounts of money internationally
- Bitcoin as a means for an otherwise excluded individual to have a decentralized global bank account, accessible simply by downloading an open source wallet from the internet, rather than having to set up with a formal financial institution
- Bitcoin—or the technology that underpins it—subsequently providing the basis for a richer set of financial services

### *Remittances (and small-scale international trade)*

Bitcoin has the potential to be used as an *intermediary* currency between other, more dominant, currencies, and thus may be useful for *remittances*. Rather than using companies like Western Union, a Filipino worker in New York might use a service that transfers US dollars into bitcoins and enables a family member in the Philippines to “withdraw” pesos on the other side. In order to make this work, there needs to be a liquid market for both dollars-to-bitcoins, and bitcoins-to-pesos. In the case of the Philippines there already are start-ups like Rebit<sup>13</sup> and coins.ph.<sup>14</sup> An example in Kenya is BitPesa.<sup>15</sup>

International remittances are under stress in various ways. For example, in Somalia the Hawala systems<sup>16</sup> have been under threat of being shut down due to concerns on the part of banks and states that they are financing terrorists. Remittances are a vital element of the Somalian economy, but companies like Dahabshiil that provide this crucial service have been targeted for exclusion by banks in places like the United Kingdom which has a large Somalian population. Bitcoin theoretically could be used to bypass such banks to form an alternative remittance channel.

Bitcoin also has potential to facilitate small-scale international commerce. Local merchants in poorer countries may struggle to access international payments systems to sell their goods abroad. For example, a rural crafts cooperative from Zimbabwe might struggle to set up a website with an integrated credit card payments system, but getting a Bitcoin address might enable them to sell products in exchange for Bitcoin tokens, thereby avoiding traditional e-commerce systems (which often involve having to set up a merchant account with a formal bank). Provided that a market exists to exchange such bitcoins received in trade back into a usable local currency, this could prove useful. For example, imagine a scenario where a small-scale independent producer of sustainable cocoa butter products sold them to US clients in exchange for Bitcoin tokens that were then redeemed for local—or foreign—currency on a Bitcoin exchange. Likewise, a small-scale non-governmental organization can easily set up to receive Bitcoin tokens as donations.

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<sup>12</sup> See Folkinshteyn et al. 2015; Maloumy-Baka and Kingombe 2015; Ammous 2015; Clegg 2014,

<sup>13</sup> See <https://rebit.ph/>.

<sup>14</sup> See <https://coins.ph/>.

<sup>15</sup> See <https://www.bitpesa.co/>.

<sup>16</sup> Informal money transfer systems that are not based upon formal, centralized financial institutions (like banks), but rather on networks of trusted brokers.

As of yet, however, there appears to be little robust empirical evidence on the extent to which such use of Bitcoin is occurring. There are many anecdotal examples (found on online forums, media sites and social media feeds) of people using it to make international transfers, or using it to buy goods internationally from small merchants, but no systematic studies beyond proxy studies of Bitcoin users.<sup>17</sup>

*As a quasi-bank account for the “unbanked”*

In the aforementioned examples, Bitcoin was used as an intermediary currency to facilitate transfers between other currencies. This may assume the user has access to a bank account, but struggles with the cost and difficulty of international transfers or e-commerce systems. It is possible, however, to focus on the Bitcoin system as a type of decentralized bank in itself. If a person has a personal computer or a mobile phone that can be used to download a Bitcoin wallet, they can obtain a public key that represents their account on the global system. This in turn comes to resemble a quasi-bank account in which you can build up savings. In the context of a country with poor banking infrastructure and reliance on cash, such a technology could—hypothetically—be a safer way to hold money, and a convenient way to transfer money in everyday transactions. Rather than merely be useful for remittance systems, Bitcoin could be an infrastructure for everyday local payments in precarious, informal settings.

In this sense, Bitcoin has potential to complement, or compete with, mobile banking applications. M-PESA has already established itself as a leading mobile banking service in Kenya, enabling up to a quarter of the working population to use mobile phones as a type of digital wallet to transfer currency by using text messages. The politics of mobile banking are tricky, though, involving struggles between regulators, banks and telecoms companies. In Nigeria, mobile money has developed more slowly, partly due to Nigerian banks lobbying regulators to only allow banks to operate mobile money services, rather than telecoms companies (IFC 2011). Bitcoin—by bypassing the incumbent institutions with their internal politics—might offer informal solutions that operate beyond the formal channels used by incumbents.

The idea that mobile Bitcoin wallets can serve as a type of bank account intersects with a broader suggestion that Bitcoin can be used by individuals—including richer individuals—as a *replacement* currency in countries with unstable national currencies. Thus, an individual can escape from their own sinking currency system and climb aboard a different “life-raft” system. In practice, this is likely to take the form of individuals obtaining Bitcoin as a backup or reserve asset within a diversified portfolio of other assets.

Garrick Hileman (2015) of the London School of Economics has drawn up a Bitcoin Market Potential Index, which ranks Argentina, Venezuela and Zimbabwe as the countries with citizens most likely to adopt Bitcoin in future. In the case of Argentina and Venezuela, the dominant factor seen to spur future usage is the perceived risk of inflation in the national currency, while in the case of Zimbabwe the dominant factor is the strong presence of informal black markets. Hileman argues that within such a setting the anonymity afforded by cryptocurrencies can help those who engage in—technically illegal—informal business transactions.

This of course presumes that Bitcoin tokens get to a point where their perceived value remains stable. Bitcoin is far from being at this stage, but the use-case makes most sense in the context of an existing state currency that is very unstable. Bitcoin might be

<sup>17</sup> See Yelowitz and Wilson 2015; Bohr and Bashir 2014; Hernandez et al. 2014,

volatile and subject to unstable bouts of speculation, but it nevertheless has attracted a resilient network of players from all over the world, including players from advanced industrial nations like the United States. From the perspective of someone in a highly unstable country, such a digital token might still appear as being relatively safer than their own currency, or at least a type of hedge or means of diversification.<sup>18</sup>

### **Counter-narratives**

Bitcoin proponents' claims about the cryptocurrency's potential to create financial inclusion do not go unchallenged. One pushback comes from traditional conservatives within security industry circles who suggest that Bitcoin-based systems will be used for money laundering and financing terrorists (Fernholz 2015), echoing similar concerns about systems like Hawala. In July 2015 it was discovered that Hacking Team—the Italian producers of government surveillance spyware—were working on cracking Bitcoin systems on behalf of government clients (Higgins 2015). There is a geopolitics of Bitcoin that potentially stands in the way of it being used freely for financial inclusion.

Equally important in the case of remittances, though, are simpler market factors. Remittances depend on a liquid market existing between Bitcoin and the currency of the recipient's country. This can be difficult because liquid currency markets tend to develop in countries with strong economic fundamentals, well-designed formal market institutions, and well-developed local intermediaries. Think, for example, of well-capitalized investment banks using advanced IT systems to trade the highly liquid pound-dollar currency market. Countries that depend on remittances do not tend to have such strong market institutions for their normal currency, never mind an entirely new internet currency.

Furthermore, a mobile money system like M-PESA in Kenya succeeded partly because it leveraged an existing network of vendors and agents. Bitcoin does not somehow obviate the need to build extensive networks of agents in remote locations who are prepared to give physical cash to people seeking remittances in a local currency.

More generally, there remain doubts as to the viability of Bitcoin within countries with poor infrastructure and technology access. Besides the issue of establishing trust in an otherwise poorly understood digital token system, there needs to be consistent internet availability and efficient electrical grids. There also ideally needs to be wide availability of smart phones: most Bitcoin mobile wallets cannot run on an ordinary mobile phone, although companies like 37 Coins were trying to develop systems to allow older phones to control Bitcoin via SMS messages.<sup>19</sup>

Even if these hurdles were to be overcome, we need to recognize that merely providing the potential for a Bitcoin account and payments service does not deeply address the problem of financial exclusion. It is true that an element of financial exclusion is the situation of people not having access to bank accounts to save money or participate in payments services. But, more crucially, exclusion generally means not having access to credit, which may be related to not having stable income streams, or access to formal property titles to act as collateral.

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<sup>18</sup> For more analysis of Bitcoin as a hedge within a more traditional portfolio of financial assets, see Dyhrberg 2015; Brière et al. 2015.

<sup>19</sup> The company has now shut down, but see <https://www.37coins.com/en/>

The field of financial inclusion thus seeks to operate on multiple fronts. For example, small-scale rural farmers might get paid physical cash in lump sums after harvests, and have to hold that, presenting a security risk. One goal of financial inclusion might be to enable the farmer to deposit that into a current account. But this, in turn, is seen as also potentially making them eligible for auxiliary services like microloans and insurance. Banks, however, might avoid rural areas or poor urban areas with high levels of informal economic activity, simply because it is too costly to roll out services relative to the returns available. One possible route to financial inclusion is thus to look beyond profit and to create financial institutions built on social and solidarity principles. Another route is to stay within the profit paradigm and focus on trying to lower the costs of services via technology—such as mobile banking technology—and to therefore boost potential profits and incentives for providers of financial services.

As a relative newcomer to this field of financial inclusion, Bitcoin—and the community that surrounds it—has yet to be proved useful on any of these fronts. It does provide a potential alternative payments system, but has yet to show how this will translate into financial inclusion more broadly. Going forward, one interesting area of development is in the realm of blockchain 2.0 applications, the potential use of Bitcoin-style technology to provide services like insurance contracts and share issuance. This is discussed in more detail on page 11.

## Techno-Colonial Solutionism from Above?

There is also a more political critique though. Those that position Bitcoin as a life-raft currency implicitly seem to suggest that it is desirable to “escape to the internet” rather than seek more fundamental solutions to a country’s underlying problems on the ground. Advocating that a vulnerable country adopt Bitcoin is at best likely to be a short-term solution, and at worst just distracts countries from strengthening already fragile institutions. It is one thing to use Bitcoin to provide a counter-power to the powerful cartels of banks in nations like the United States, but in a country like Zimbabwe the real need may be to strengthen the integrity of the banking system, something that can only be achieved by hard, long-term political battles.

Escaping weak local institutions might help individual people, but does little to empower the broader social majority who remain reliant on the existing systems. Those who are most likely to seek escape are, perhaps, social elites with high education, access to technology and capital to protect. The rhetoric of cryptocurrency superiority—often articulated by cryptocurrency start-ups—even has neocolonial tinges: are local elites within fragile countries being encouraged to buy into a “forget your local systems, rely on our technology” narrative articulated by Western tech gurus?

In the minds of such technologists—whether hard-edged businesspeople or progressive Silicon Valley tech optimists—technology is often viewed as a market-driven force for pragmatic problem-solving. Viewed through such a “solutionist”<sup>20</sup> lens, the world appears in apolitical terms as a series of things that have been solved and things that remain to be solved with technology-driven enterprises. This “technology-as-saviour” narrative is essentially top-down in nature—it is imagined that the problems of people in “poorer countries” would be solved by the optimistic entrepreneurial drive of American Stanford graduates. It is sometimes exemplified in generic ICT4D (Information and Communication Technology for Development) imagery of

<sup>20</sup> A term associated with the tech critic Evgeny Morozov. See his 2013 book *To Save Everything, Click Here: Technology, Solutionism, and the Urge to Fix Problems that Don't Exist*.

marginalized Masai people huddled around a computer in a village, or a Vietnamese rice paddy farmer smiling at a smart-phone.

Technology solutionism can be contrasted to more holistic anthropological perspectives concerned with understanding the socially embedded use of technology in particular political and cultural settings. Technology does not operate in a vacuum, and Bitcoin systems do not just descend on “poorer countries” for the empowerment of all. The solution gets sold by particular people and adopted by particular people within particular contexts.

More generally, the narratives around financial inclusion, microcredit and “the unbanked” often have the same solutionist ethos. Is financial exclusion really an unfortunate and avoidable problem in search of a profitable technological solution, or is it an integral part of an unequal economic system? Should the end goal really be to bring marginalized people into the normal financial markets, or should the focus be on creating meaningful alternative institutions based on principles of social solidarity? Right now, much of the Bitcoin community appears ambivalent about where they stand on that. Bitcoin certainly is an alternative, but is it just an alternative way of doing business-as-usual?

## **Forking Critique: Alternative Cryptocurrencies**

One phenomenon within the cryptocurrency space is the use of the underlying source code of Bitcoin to create alternative cryptocurrencies—or alt-coins—with slightly different characteristics to Bitcoin (Ong et al. 2015). While some of these “forks”<sup>21</sup> have been opportunistic attempts to make speculative profits, others are explicitly designed to address problems the designers see in Bitcoin, and thus often embed critiques of the Bitcoin model. For example, Freicoin<sup>22</sup> was an attempt to deal with the tendency for people to hoard bitcoins by introducing deliberate inflation (via “demurrage”) into the system. Others have less intensive mining processes, or have explicitly attempted to build a different culture around their currency, as in the playful non-competitive culture of Dogecoin.<sup>23</sup>

Regardless of these alterations, cryptocurrencies in general have become associated with free-market thought. In particular, they have become associated with the hyper-individualism of conservative libertarianism, some adherents of which see cryptocurrency as a more efficient means to facilitate trade within a pure capitalist model (Golumbia 2015).

Such champions of cryptocurrency may argue that the financial sector rips off customers, but rather than viewing this as a normal feature of profit-driven business within a naturally political marketplace (constructed over time in incremental fashion by politicized human institutions), the problem is often seen to be the infringement of the political into an imagined apolitical (and ahistorical) realm of the market: banks are abusive because they are too intertwined with the political system, which stymies the workings of what would otherwise be a neutral free-market. The way to solve this is thus to disintermediate them via apolitical cryptocurrency technology.

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<sup>21</sup> In open source software culture, a “fork” occurs when someone takes the code of an existing application and uses it as the basis for a new application.

<sup>22</sup> See <http://freico.in/>.

<sup>23</sup> See <http://dogecoin.com/>.

To those with a more left-wing libertarian impulse, though, cryptocurrency is interesting because it has features that potentially allow for non-hierarchical self-organization and peer-to-peer collaboration within a communitarian network structure. There are thus emergent attempts to build cryptocurrencies that can be used as a means of exchange for explicitly cooperative and collaborative enterprises that exist outside the logic of normal market processes (see De Filippi 2015).

One example of this is Faircoin,<sup>24</sup> spearheaded by Fair.Coop, an initiative started by Spanish activist Enric Duran. The project is still at an early stage, but Fair.Coop is seeking to establish Faircoin as a global cryptocurrency to be used for transfers among a global cooperative network. Once established, it is believed that the global currency can also be used as the backing for more local mutual credit systems. As a hypothetical example, imagine a commune in Barcelona sending Faircoin tokens in solidarity to a farmer's cooperative in Moldova, who in turn can use that as the basis for a more local mutual credit system to help individual farmers within the cooperative.

In seeking to utilize cryptocurrency technology outside of a capitalist model, Faircoin is explicitly aligned with principles found within left-wing anarchism and autonomism. It has a much stronger focus on collaborative solidarity and autonomist self-governance, viewing equality and redistribution as more important than rigid protection of historical property rights.

Such an approach runs contrary to many financial inclusion narratives that suggest that economic inequality is due to external factors that stymie the efficient workings of markets, thereby creating market failures. For example, market-based approaches may identify poorly defined property titles as a cause of market exclusion, and therefore of poverty. The financial inclusion practitioner operating within this framework may seek to rectify that, in order to extend market systems into areas where they do not currently operate well. The theory is that this will give individuals within that situation a better chance of competing within the normal market.

A project like Faircoin, on the other hand, starts from the assumption that, while formal market systems may be a source of economic growth and individual enhancement, they are simultaneously the source of social inequality, individual alienation and community disintegration. Thus, rather than trying to find narrow solutions to individual hardship, initiatives like Faircoin seek to create alternative economic systems that bypass normal markets, and that rewrite the deep level rules of economic engagement. In particular they place heavy emphasis on the basis of economic life being mutual cooperation and solidarity, rather than individual competition for narrow economic success.

What makes the cryptocurrency element of this interesting, is that—traditionally—autonomist communities have often retreated to small-scale localism as a means to foster close human relationships. The vision of projects like Faircoin, on the other hand, is to build large-scale networks of solidarity-based collaboration using technology. It is in potentially enabling such “collaboration at scale” that cryptocurrency technology begins to look like a force for radical economic alternatives.

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<sup>24</sup> For a technical white paper on this, see <https://chain.fair-coin.org/download/FairCoin2-Draft.pdf>.

## Blockchain 2.0 Technology

Cryptocurrencies are subject to all manner of ideological battles, but one thing most interested parties agree on is that the underlying concept of a *decentralized public ledger, collectively maintained by a network of participants* is very important. This has led to an interest in blockchain 2.0 projects, or the use of a blockchain ledger to record things other than currency transactions (Swan 2015).

It is useful to think of a blockchain as a database that incrementally gets built up by a network of participating parties who run the same software, and that is subject to the constraints and rules set by the underlying software they run. A blockchain, as the name suggests, gets built up by blocks of data gradually being “chained” together. It could almost be imagined as a spreadsheet that is gradually built by new cells being chained on. A blockchain database continues to be built and maintained so long as the software continues to be run. Thus, unlike a centralized database held by a single entity, it continues to stay “alive” even if individual participants pull out (or go bankrupt, for example). It creates an indelible record, resistant to tampering by any individual party.

Furthermore, if you tweak the code of the underlying software being run by participants, the nature of the resultant blockchain changes, opening the possibility of creating blockchain databases storing all manner of diverse data, including, for example, property titles, contracts, shares (Lee 2015), voting decisions (Noizat 2015), or even reputation scores (Scott 2015b). Groups like Ethereum, Counterparty and Blockstream<sup>25</sup> are working on building platforms to allow people or start-ups to implement blockchain-based systems. For example, Provenance is a start-up attempting to use the Ethereum system to create a highly transparent ledger of global corporate supply chain data.<sup>26</sup>

At the cutting edge of the scene are experiments with smart contracts, which are small bundles of code—or scripts—that can be recorded on a blockchain, and that participants can interact with in order to undertake simple tasks (Wright and De Filippi 2015). For example, we might code a simple insurance contract (see Mainelli and Von Gunten 2014). Imagine a coded blockchain-based script that is activated when two parties send bitcoins to an escrow Bitcoin account that is controlled by the script, and which will release the bitcoins in the future to whoever wins a bet on the average level of rainfall over a certain period. This smart-contract is programmed to read data from weather agencies, and after a set amount of time releases the bitcoins from the escrow, sending it to a farmer who requires protection against low rainfall. This is a blockchain-based weather derivatives contract.

Such simple building-block contracts could be woven together to form the basis for more complex multi-stage or multi-function entities, referred to by some as decentralized autonomous organizations (DAOs) (Pangburn 2015). Such DAOs are hard to conceptualize, and seem to be in the realm of science fiction to many people, but are essentially advanced multi-stage algorithms held in play on a decentralized network of computers, rather than controlled by a single management team.

To those with more immediate pragmatic needs, blockchain systems seem most useful in recording simpler data. One element of blockchain systems that has captured the interest of those with a free-market economics orientation is the way in which they may

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<sup>25</sup> Ethereum <https://ethereum.org/>, Counterparty <http://counterparty.io/>, Blockstream <https://www.blockstream.com/>.

<sup>26</sup> See <https://www.provenance.org/>.



be used to indelibly record property rights. One frequently cited use-case for this are land registries (Williams 2015). In countries with weak governance and record-keeping systems, there is a problem of double-registry of land, land title fraud or uncertain title to land, something that could potentially be tackled with a blockchain system that indelibly records land title in a definitive public manner. Indeed, in 2015 Honduras announced a deal with American company Factom<sup>27</sup> to develop a blockchain-based land registry (Chavez-Dreyfus 2015).

In an (extraordinarily titled) interview in Forbes called “How Bitcoin will end world poverty” (Forbes 2015), Brian Singer suggests that such blockchain technology is the ultimate way to realize Hernando de Soto’s vision of building strong property rights in informal economies. If people are given identities and titles to property, otherwise inert capital can be activated. Property title can be used as collateral, enabling cheaper bank lending to informal entrepreneurs.

This analysis rests on the assertion that, provided that property and contract are well protected, market and capitalization processes will help lift people out of poverty, bringing forth the hidden value of informal economies. But, instead of hoping for a democratically governed state to optimize these market processes, the poverty-eliminating potential of property and markets might be activated by replacing weak state institutions with technology, another form of political “escape”.

It is unclear, though, that such blockchain registries necessarily solve underlying problems. In places that experience issues like uncertain land title, there tend to be weak institutions that give rise to the uncertainty in the first place. In such a context, merely presenting a technology that can be used to record claims means little unless there are strong legal institutions that recognize the recorded blockchain claims, and strong procedures in place for who gets to make the claims. There is a certain irony here. Blockchain technology is potentially most useful in situations where there are weak institutions and parties who cannot easily trust each other—for example, in a setting like Afghanistan, with low state capacity and low trust amidst conflict—but such countries are also often in the weakest position to effectively implement such technology.

## Techno-Libertarian Evangelism?

One nascent phenomenon related to blockchain technology is the emergence of what might be called techno-libertarian evangelism—the presence of blockchain “missionaries” in developing countries articulating a technology-as-saviour and markets-as-saviour gospel alongside an anti-state message. For example, in Ghana a group called Africa Youth Peace Call<sup>28</sup> organized a 2015 Blockchain Land Title Summer Liberty and Entrepreneurship Camp to discuss how land registry can be moved from state institutions to blockchain ledgers. The group’s stated objective is in “teaching free-market ideas and skills to the people of Africa”, but despite appearing as a Ghanaian organization, most of the group’s board are foreigners, including American free-market economists Ken Schoolland, Warren Coats and Louis James, and libertarian activist Michael W. Dean (Africa Youth Peace Call 2015). The camp attendees included the outspoken American libertarian activist and investor Roger Ver.

<sup>27</sup> See <http://factom.org/>.

<sup>28</sup> See <https://www.cryptocoinsnews.com/liberating-northern-ghana-block-chain-model-africa/>.

The camp was also attended by Bitnation,<sup>29</sup> a group offering one of the most radical articulations of the techno-libertarian message. Bitnation has presented a vision—at least in principle—of hosting completely alternative state institutions (such as security and legal institutions) on blockchain systems, describing states as governance service providers that might be outcompeted by technological platforms. In the words of founder Susanne Tarkowski Tempelhof, “Bitnation is a Governance 2.0 Operating System, designed to disrupt the nation-state oligopoly through offering more convenient, secure and cost-efficient governance services” (Prisco 2015a). Bitnation posits a world where one might theoretically be able to “opt out” of states and “buy into” new governance institutions in the same way one might select coffee from a supermarket. This vision of a “market in governance services” only holds together if it is assumed that markets can exist *prior* to political governance systems. This is in contrast to those who argue that markets themselves are underpinned by political governance systems that uphold the property rights that enable them to exist in the first place.

More recently, Bitnation started offering blockchain services to refugees,<sup>30</sup> including a blockchain emergency ID, Bitcoin visa cards and Bitcoin refugee aid. It has also entered into a deal with the Estonian government to provide users of Estonia’s “E-residency” system with a blockchain notarization service (Prisco 2015b).

These visions of “coded governance” (Wood and Buchanan 2015), blockchain law and programmed smart contracts do not sit entirely comfortably alongside the traditional legal contract profession. Contracts are representations of frequently ambiguous, unpredictable and messy relationships between imperfect humans with imperfect knowledge. Such relationships cannot easily be pre-programmed, and much of the work of lawyers involves resolving and interpreting contracts in light of changing realities. Building systems that seek to move away from such politicized negotiation can sound utopian, but might equally lead to situations of inflexible technocracy.

Furthermore, while the technological novelty of blockchain systems is authentically exciting, the darker side is that much of the more extreme rhetoric has hinged on “fixing” human imperfection, rather than accommodating it. As argued in the essay *Visions of a Techno-Leviathan* (Scott 2015a), the most ardent blockchain proponents often present (whether advertently or inadvertently) a dim vision of human nature, suggesting that people need to be protected from themselves by deferring responsibility to “trustless” technological platforms that will enforce contract-based relationships between atomistic individuals in an escape from community.

## The Emancipatory Potential: Collaboration at Scale?

Nevertheless, there is a nascent trend—found within groups like Swarm,<sup>31</sup> Blockstream and Ethereum—to de-emphasize the focus on the trustless nature of blockchains, and instead characterize blockchain technology as trust-enabling. Blockstream, for example, claims to “transform global systems of value exchange that, by design, make it possible to trust anyone” (Blockstream 2015). The idea is that in removing the need to trust central authorities, blockchains could be platforms upon which build new forms of non-hierarchical cooperation between strangers. To understand this, though, it is necessary to

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<sup>29</sup> See <http://www.bitnation.co/>

<sup>30</sup> See <https://refugees.bitnation.co/>

<sup>31</sup> See <https://swarm.fund/>

briefly look more deeply into the political dynamics of, and ambiguity within, the term “trust”.

Normally, interpersonal trust is built through close personal contact, and in the absence of such a relationship, such trust may be low. If, however, the need to build close personal relationships prior to trusting someone is removed, it may be possible to extend a form of—perhaps impersonal—trust to those you do not know.

In many modern societies this already extensively occurs through the use of formal centralized authorities and formal legal contract systems that remove the need for individuals to know each other personally before engaging in relations. You may not know the shopkeeper, or the quality of his products, but you have a detached form of trust in the consumer protection laws. An institutional trust layer stands guarantor to the otherwise trustless relationship between you and the shopkeeper.

This dynamic applies also to normal monetary systems. A British £20 note is a piece of paper representing a promise to pay, but in a world without strong state institutions it is unlikely that a stranger would accept such a promissory note from another stranger in exchange for real goods and services. Nevertheless, within the context of the British state and legal system, I can hand over that paper bill to an unknown shopkeeper and get coffee in return. The power of that note has been historically constructed via a constellation of official state institutions (and non-state actors like commercial banks) that I have an abstract form of trust in, and their perceived legitimacy (or hegemony) is often so well engrained that such notes will easily circulate, especially once people becomes *dependent* upon them for everyday exchange.

The trust dynamics are thus multi-faceted.

1. The note works through its embedding within an institutionalized trust system.
2. But that removes the need for any two people to have interpersonal trust.
3. The two strangers may experience this as a trustless or trust-free exchange at an interpersonal level, but only because they both put trust in a higher-order third-party guarantor.
4. In removing much of the need to trust strangers in commercial exchanges, we might characterize such money as a force for atomizing and disconnecting people from each other, weakening non-state community structures.<sup>32</sup>
5. On the other hand, we might say that the exchange between two strangers would not have happened if it had not been enabled by the money system. From this framing, modern money is a trust-enabling system that gives rise to transactions that otherwise would not exist.
6. Furthermore, in removing a source of potential tension between those strangers, the money might even lay the groundwork for a pleasant, albeit shallow, relationship.

The main point, though, is that while you can choose to characterize modern money as either atomizing and alienating or as trust-enabling between two strangers, both strangers will need to trust in the state institutions. It is this latter point that blockchain proponents initially fixate upon. To frame it within the old view found in Hobbes’ *Leviathan*, if people defer part of their freedom to a state in order to secure themselves (and their property), they must implicitly trust that the social contract will be upheld.

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<sup>32</sup> Indeed, part of the rationale of complementary currency systems like timebanks is to rebuild community structures that have disintegrated or weakened in the face of a modern scaled monetary economy.

For those who earnestly believe in the democratic political process, it is assumed that the modern Leviathan of the democratic state can do this while representing the interests of all. Conservative libertarians, however, often present the state as representing the interests of corrupt politicians,<sup>33</sup> while left-leaning anarchists often present the state as representing the interests of powerful capitalists.

### *Individualistic vs communitarian readings of blockchain technology*

Thus, the original vision of *libertarian* blockchain evangelists was focused upon the idea that blockchain systems based on cryptography could do away with the need for trusted (or, perhaps more accurately, hegemonic) central intermediaries that would normally be required to mediate relations between strangers. Thus, “In cryptography we trust” has become a staple of Bitcoin bumper stickers and t-shirts, along with proclamations that the technology is “politics free”.

The conservative libertarian vision, however, has often gone further to imply that the reason why centralized institutional systems are flawed is because they are inevitably controlled by untrustworthy and self-interested humans (e.g. the politicians, the Federal Reserve board, the bankers). Furthermore, the reason why those humans are like that is due to “human nature”, which is self-interested. Humans thus inevitably seek to gain at the expense of others if given a chance. The implication is not just that some powerful people abuse others who are weaker, but that all people seek to abuse all other people if given a chance, a sentiment reminiscent of Hobbes’ “war of all against all”.

In this context, the cryptographic apolitical purity of a blockchain system appears not just as a way to stop abusive people who control central institutions, but as a way to once-and-for-all resolve the problem of how to establish contractual relationships between untrustworthy human beings who seek out their self-interest. This is the neo-Hobbesian view of a blockchain system as the ultimate and perfected arbiter between individuals who would otherwise be trying to swindle, defraud or damage each other. This techno-leviathan subsequently lays the ground for a world where people will not need to trust either each other or central institutions as they individually pursue their self-interest.

It is possible, however, to build a communitarian anarchist reading of the same technology. Social anarchist (or libertarian socialist) conceptions of the world do not position human nature as fundamentally self-interested, but rather assert that people get alienated and corrupted within the bureaucratic hierarchies and power dynamics of large-scale capitalist system institutions. Anarchist traditions have thus often advocated the need to develop smaller-scale non-hierarchical and solidarity-based systems where people can experience their social and interdependent nature, and thereby achieve emancipation.

The tantalizing open question for those inspired by this tradition is whether blockchain systems can be a basis upon which people can easily interact with distant strangers for collaboration at scale. Blockchain systems—at least superficially—offer a vision of large-scale egalitarian self-organization far beyond the scale of ordinary anarchist attempts at building cooperative communes. In this vision, the objective is to replace hierarchal centralized institutions with decentralized ones, but the point of doing this is

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<sup>33</sup> The libertarian insistence on minimal government recognizes that the state is necessary to protect property rights and security, but insists it should do nothing else, lest it fall prey to the personal interests and agendas of the people who occupy its official positions.

not to once-and-for-all perfect a means for naturally self-interested individual humans to contract with each other. Rather it is to allow naturally social beings to flourish and collaborate with each other in a spirit of cooperation, not individualistic competition.

An interesting exploration of this is the Coin Center paper on Distributed Collaborative Organizations, which describes explicitly collaborative entities that issue blockchain-based shares—or crypto-equity tokens—that give the holders ownership or membership rights in a type of decentralized cooperative (Bollier et al. 2015). How such organizations might end up looking in the real world remains to be seen, but they may be an interesting new form to explore in the quest to build social and solidarity-based finance. Can a city network of informal street vendors run a collective mutual insurance pool between themselves using only their smartphones to interact with a distributed ledger system, with no central financial institution involved? Can a regional mutual credit system—effectively a ledger of credits and debits—be implemented in a decentralized blockchain form?

### *The everyday pragmatics of decentralized blockchains*

The individualistic and communitarian poles presented here are, in reality, often blurred. For both, though, the deep question is how to get people who may be used to existing systems of institutionalized trust to start using another one. How does a blockchain system gain legitimacy and stability, such that users will adopt it and grow to trust the safety of their position within it?

State systems are not immune from instability, but for many they provide the only formal and relatively predictable everyday protections. The small business owners in South Africa might not like the tax authorities and regulators, but they know their basic rights, protections and responsibilities—and the flexibilities of those—and can engage in commerce on reasonably solid ground. Blockchain systems, on the other hand, do not as of yet offer such protection. It is telling that Ethereum deliberately and publically crossed out the word “safe” in its 2015 frontier release of its decentralized blockchain software platform. For the everyday pragmatic practitioner then, the impulse is to implement blockchain systems very firmly within the existing institutional context of modern nation states and the formal global economy, rather than outside of such systems.

A second question, for the communitarian conception in particular, is how you scale cooperation up without lapsing back into a bureaucratic, alienating and unaccountable system. Thus, the question is how to build decentralized governance systems that give people true voice in the decentralized technology systems.

Within much original Bitcoin culture, the governance system was said to be based on open source principles: in this conception, a project is open for anyone to get involved, and if they do not like the direction they can fork the code to create something else. The primary political action then is *exit*, but there is a chance for voice if you can influence other developers on the forums and at the conferences. The power dynamics of this process is often glossed over, but it is important to explicitly interrogate it. In much open source software philosophy, it is often uncritically assumed that everyone has equal power, despite the fact that certain individuals—often those with technical skills or capital—dominate apparently open projects.

Indeed, despite being presented as democratic, open source projects have the potential to turn into rigid concretized systems where each individual participant has little power to change anything because there are no clear channels to affect change other than to

fork the code and create a competing structure, which is often an unsatisfactory solution.<sup>34</sup> The countless attempts to create alt-coins based off the original Bitcoin source code have often failed, and key high-profile developers<sup>35</sup> within the Bitcoin community have effectively become unelected decision makers for all the legacy users who need the system to be upgraded.

Hierarchical states and corporations may be imperfect and alienating, but they provide—theoretically at least—formal channels to change things that are not working. Small-scale anarchist communes who set themselves up in opposition to the hierarchy present in such behemoths also install very explicit governance channels for individuals to raise concerns. Any attempt to scale such a commune up through blockchain technology thus also requires the simultaneous creation of decentralized governance systems<sup>36</sup> for individuals to have a voice within the decentralized technology system. It is interesting to note that the aforementioned Fair.Coop has explicitly been trying to construct such governance systems in addition to developing the technology of Faircoin.

## Recommendations for Further Research

This paper has attempted to provide an overview of some key dynamics within Bitcoin and blockchain technology that may be of interest to social and solidarity finance (SSF) practitioners. The technology is still new, but it is apparent that there are potentially empowering uses of it in certain contexts. Nevertheless, while the community around this technology is enthusiastic and experimental, it is still prone towards the elitist, tech-centric outlook of disruptive technology start-up culture. A key role for SSF practitioners then, is to consider how blockchain technology could be implemented with sensitivity to the real struggles people face in implementing technology within diverse cultural and political contexts. One blockchain does not fit all.

A good starting point would be to build new research into the following.

1. The ongoing development and deepening of global Bitcoin markets, tracing to what extent those in developing country contexts are actually adopting it. There is a definite need for baseline studies of usage, against which future changes can be measured.
2. The challenges and potentials for the Bitcoin system's usage from a financial inclusion perspective. This includes its use as a remittance system and as an alternative bank account. This can be complemented with studies on the extent to which blockchain-based property title systems (such as land registries), have the potential to open up normal bank financing to people who otherwise cannot get access to credit from financial institutions.
3. The extent to which Bitcoin as a currency system could interact in the future with blockchain 2.0 smart-contract technology to create collectively-run (and solidarity-based) financial schemes that do not rely upon normal financial institutions. Might rural weather insurance systems be built upon mobile phones? Can a farmers' co-operative establish itself via a crypto-equity system?

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<sup>34</sup> This is especially difficult when it comes to network-based systems that gain their power from the amount of users they have. A legacy network like Bitcoin has large numbers of users who are unwilling to switch to a better platform unless everyone else does. This means nobody moves, and competition from alternatives is not an effective regulatory force.

<sup>35</sup> Such as Gavin Andresen.

<sup>36</sup> For an interesting exploration of emergent e-governance platforms that may be used in such a process, see D-Cent Project <http://dcentproject.eu/>.

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