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RECEIVED 29 December 2023

ACCEPTED 22 February 2024

PUBLISHED 15 March 2024

CITATION

Papadimitropoulos V and Perperidis G (2024),
Universal basic income on blockchain: the case
of circles UBI.

Front. Blockchain 7:1362939.
doi: 10.3389/fbloc.2024.1362939

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Universal basic income on blockchain: the case of circles UBI

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The paper reviews Circles UBI as an illustrative case study of implementing the idea of universal basic income (UBI) on blockchain. Circles was born out of the Gnosis Chain as a more democratic alternative to Bitcoin coupled with the ambitious political project of algorithmically distributing UBI. Backed by the Gnosis Chain, Circles Coop was founded in 2020 to implement this idea in Berlin. Examining the failure of the Berlin pilot helps us draw substantial conclusions with regard to the implementation of UBI on blockchain. UBI alone, on blockchain or not, is not enough to solve the problems its proponents argue against. UBI would be helpful as a tool if plugged into a model of production embedded into a political strategy aiming to fix key problems of current societies such as gaping inequalities and climate change. We give a snapshot here of the model of open cooperativism as a counter-hegemonic political project vis-à-vis neoliberalism. Circles UBI could plug into the model of open cooperativism as a distribution and liquidity injection mechanism to foster the transition towards a commons-based ethical and sustainable post-capitalist economy.

KEYWORDS

UBI, blockchain, circles, mutual credit, open cooperativism, the commons

Introduction

Technological change has come to revive an age-old and long-standing argument on universal basic income (UBI), represented by all sides of the political spectrum, from conservative to neoliberal, liberal, leftist, socialist, and crypto-libertarian politicians, scholars, intellectuals, activists, and entrepreneurs (Cholbi and Weber, 2020; Torry, 2023; Wright and Przegalinska, 2022: 5–9). Universal or unconditional basic income¹ (UBI) entails a permanent (from some age until death), regular (monthly or more frequent) minimum or foundational (basic) cash or crypto-payment (money, not in-kind) to every (universal, unconditional, and perhaps even non-withdrawable) individual (not family), regardless of their income or willingness or ability to work (Torry, 2023: xvii; Standing, 2017: 3–7; Hamilton et al., 2021; Wright and Przegalinska, 2022: 3). To qualify as a UBI, a central policy or decentralized mechanism must make (1) universal, (2) unconditional, (3) periodic, (4) cash or crypto payments to (5) all individuals. The advent of blockchain technology has introduced multiple crypto-decentralized variants of UBI often considered in tandem with state-driven centralized versions (Chynoweth, 2023). In

1 <https://www.ubi.org/>

TABLE 1 Pros and cons of UBI.

Universal basic income	
Pros	Cons
Addresses poverty, insecurity, and inequality	Increases economic immigration
Provides freedom and autonomy, supports unpaid care work	Disincentivizes work and makes people lazy
Addresses climate change	Decreases economic growth eventually hurting the environment and vulnerable populations
Reduces bureaucracy	Is expensive and increases administrative costs
Redistributes wealth	Increases injustices by taxing the hard-working against the lazy
Discourages low wages by giving bargaining power to workers	Increases dependency on government
Automation will increase productivity, lower prices, and render work redundant, thereby making UBI a necessity	Decreases productivity and increases inflation due to more money (demand) chasing fewer goods (supply)
Addresses AI-induced technological unemployment	Reduces economic efficiency as well as overall producer and consumer surplus due to central planning inadequacy to coordinate market forces
Increases social justice and secures democracy	Threatens democracy

general, UBI is highly controversial. Arguments by all sides display a wide-ranging list of pros and cons (Table 1).

We make the case here that a UBI alone, be it centralized, crypto-decentralized, or both, is not enough to solve the problems that its proponents argue against. A UBI is just a tool that could be plugged into a model of production embedded into a holistic political strategy aiming to fix key problems of current societies such as gaping inequalities, power asymmetries, climate change, migrant crisis, populism, individualism, and so on.

We offer some empirical grounding of our argument here by illustrating the case study of Circles UBI. The failure of the implementation of the Circles UBI Berlin pilot testifies to the need for UBI to connect to a mode of production, which would be organically embedded in a holistic socio-economic model. We situate our argument here in a strand of literature that examines the idea of UBI through the lens of prefiguring Internet-enabled grassroots organizational models such as the commons, post-growth, degrowth, and the model of open cooperativism (Bauwens et al., 2019; Demaria et al., 2019; Hickel and Kallis, 2020). A literature review on post-growth and degrowth models has documented a lack of concrete distributional and monetary policy proposals (Engler et al., 2024). Distributional and monetary policy proposals such as complementary currencies and various forms of taxes on income, wealth, and capital are fragmented and dissociated from a bird's eye view of the economy as a whole. We seek to contribute to the discussion by plugging a blockchain-based UBI into the model of open cooperativism.

We give a snapshot here of the model of open cooperativism (Kostakis and Bauwens, 2014; Bauwens et al., 2019) that places commons-based peer production at the center of collaboration between: (1) civil society organizations producing material and immaterial commons; (2) ethical market entities adding exchange value on top of the use value of the commons; and (3) a partner state enabling commons-based peer production. The model of open cooperativism promotes the concept of the commons that resonates with the degrowth movement, which aims to reduce inequalities via redistribution mechanisms and address climate

change by limiting resource and energy throughput in the economy. A model of open cooperativism would deploy the commons such as UBI-inspired mutual credit systems and community currencies to forge cross-sectoral post-capitalist value chains and close the loops in the supply chains circulating value across commons-based economies striving for sustainability, inclusion, and the equitable distribution of value among multiple stakeholders. The main argument here is that ethical market entities that gain access to the commons benefit from innovation spillovers and reduce production and transaction costs, thereby gaining a *cooperative* advantage vis-à-vis closed socio-economic models. Contrary to the tragedy of the commons (Hardin, 1968), the model of open cooperativism induces a transvestment of capital into the regeneration of the commons, thereby resulting in the distribution and redistribution of profits, income, and rents. Thus, the model of open cooperativism forces capitalism to adapt to post-capitalism in the long run.

The politics of money

The concept of UBI has sparked interest across all sides of the political spectrum during the last few decades. Leftists advocate for UBI as a means towards socialism and communism. Classical liberals and conservatives support UBI to spur free markets and fair competition between individuals, governments, and firms. Libertarians and anarchists call for UBI to get rid of the power of corporations and big government altogether (Wright and Przegalinska, 2022: 5–9).

To further disentangle the concept of UBI and position Circles UBI project along the political spectrum, it is essential first to understand what money is in economic theory. We can, in general, classify two main theories of money: the commodity theory of money and the sovereign theory of money (Crocker, 2020: 32–35). In the commodity theory of money, money is a commodity that emerges as a neutral and independent medium of exchange out of competition between rational agents bargaining

in the markets of labor and capital to reach multiple equilibria of supply and demand. In short, money as a commodity and medium of exchange is determined by market forces and relevant factors of production. In the sovereign theory of money, money is not a neutral and independent medium of exchange. The very constitution of money as medium of exchange is an act of political power rather than an economics variable alone. In that sense, money has been initially constituted by state authorities as a medium of account to settle debts and taxes and has evolved over the years into a medium of exchange between market forces variously co-mingling with state authorities. Following the decoupling of the US dollar from gold by Nixon in the 1970s, fiat money, that is, money issued by central banks, combined with credit and commodity money to compose the basic types of money in our current economies. Bitcoin and cryptocurrencies add up to the current state of affairs to establish for the first time in history the decentralized management of owning a virtual asset (Schär and Berentsen, 2020: 21).

Fiat money differs from cryptocurrencies in the following: (1) it is money printed by central banks, whereas cryptocurrencies are tokens issued by decentralized communities or teams of entrepreneurs that deploy code and smart contracts on blockchains to launch various projects; (2) fiat money is recorded on the private ledgers of central and commercial banks, whereas cryptocurrencies are stored on the distributed, immutable, time-stamped, and self-governed ledgers of blockchains; and (3) the supply of fiat money is determined by central bank policies, whereas the tokenomics of cryptocurrencies are determined by algorithms and relevant market forces. Bitcoin is virtual money issued under competition, the supply of which is determined by computer code, network effects, and aggregate demand. It allows a global network to securely transact and exchange value without the need for a costly intermediary and the fear of censorship and confiscation (Catalini, 2017). Bitcoin has still limited exchange value and is mostly used as a store of value. It is mostly considered a hedge for inflation as well as a speculative digital asset.

Circles UBI: money as a commons

Blockchain technology has spawned in recent years numerous cryptocurrency-based UBI projects² that can potentially solve age-old challenges, such as a lack of participant interaction, cumbersome bureaucracy, and negligent monitoring (Chynoweth, 2023). State-backed UBI projects, in general, are ridden with political and economic challenges, making them controversial and risky to implement or promote. Cryptocurrencies, conversely, are not subject to the same amount of administrative costs, oversight, regulation, or taxation. Cryptocurrencies, however, are not risk-free since they come with volatile values, regulatory hurdles, security issues, and the global digital divide³.

The introduction of global blockchain networks changes the conversation about UBI significantly. Now for the first time in

history, it is trivially easy to create financial applications that are universally accessible to anyone on the Internet. Starting with Bitcoin and moving on to smart contract platforms like Ethereum, blockchain technology has achieved widespread popularity by routing around the gatekeepers and roadblocks that make innovation so difficult in the legacy financial system. Smart contracts and the blockchain create a very promising environment in which to implement a new UBI system (Circles whitepaper⁴).

Circles UBI is a protocol built and deployed on the Gnosis Chain⁵ in October 2020 (Linares, 2023). The idea behind Circles was to create a fairer and less concentrated cryptocurrency than Bitcoin and to connect it with a political project aiming to provide a UBI for all people across the globe to cover their basic needs (Table 2). Contrary to a state-backed UBI, the Circles protocol distributes ERC-20 tokens equally and unconditionally on a per person stateless basis (Avanzo et al., 2023). Contrary to other blockchain-based UBI projects, Circles is not a commodity type of a virtual asset designed for the purposes of accumulation and profit. It is rather a unit of credit issued to settle debts on the basis of promises made among individuals.

Circles is a form of electronic money, which people have the power to issue on a periodic, individual basis, without means-test or work requirement. People, therefore, take the responsibility of issuing promises to one another, without the need to repay it back to a bank or a state. The only prerequisite is access to the Internet and that other people in your community trust you in order to enter the system (. . .) The goal of Circles is to build the social and technical infrastructure for the distribution of value, where people decide what is important in life, giving people the unconditional power to issue promises with others around them (. . .) Circles strengthens the infrastructure needed to build more resilient and complementary supply chains which allow people to access their basic needs at affordable prices, using CRC (Circles handbook).

A main problem, initially, was how to verify such a vastly distributed system in a decentralized manner and protect it from a Sybil attack. On blockchain, a Sybil attack is a type of fraud when one person or entity can make multiple fake accounts to take over a network. A potential solution came from the core value proposition of Circles UBI project to assign trust to people themselves individually to be checking on their own interpersonal relationships and networked transactions. Trust has been outsourced from software code to people themselves to back up algorithmically enabled peer-to-peer, people-powered money in the form of mesh credit or mutual credit. Mutual credit is interpersonal and contrasts centralized surveillance fiat or commodity-backed credit and payment systems as in the case of central bank issued money, commercial banks, PayPal, Visa, etc. (Cabaña and Linares, 2022; Criscione et al., 2022). Circles UBI is a decentralized blockchain-based sovereign version of credit money operating on a web of trust. It is a sort of a decentralized voting system that distributes reputation points across a web of trust graph by issuing

2 <https://positiveblockchain.io/database-category/finance-insurance/universal-basic-income/>

3 <https://www.binance.com/en/feed/post/919726>

4 <https://github.com/CirclesUBI/whitepaper>

5 <https://www.gnosis.io/>

TABLE 2 Bitcoin vs. Circles.

Bitcoin	Circles UBI
Digital asset, commodity money	Credit money
Scarce supply (21,000,000)	Abundant supply, demurrage 7%
Store of value	Medium of exchange
Impersonal	Personalized value
Denominated in fiat value	Peer to peer value
Energy consuming, proof of work	Proof of stake
Hoarding, speculation	Liquidity injector
Oligarchic money (wealth transfer to whales/early adopters)	Fair distribution to all
Merit-based, mining	Unconditional

non-fungible individualized tokens that can be used mostly on a local level but can circulate also on a global level. It thus legitimizes connections and transactions in a socio-economic network.

The Circles standardized smart contract issues one Circles ERC-20 token (CRC) per hour for everyone who has an account in the network. To get an account, one needs to create a Circles Wallet and gain the trust of at least three trustees to start issuing. One can then spend or gain CRC by selling products or services. CRC cannot be exchanged for fiat or cryptocurrency but only for products and services. To become a buyer or a seller (private or business), one needs to register at the Circles Marketplace, which is the match-making infrastructure for resources and needs. Today, Circles UBI accounts number around 200,000 in total. The Circles UBI protocol plugs in the pathfinder algorithm to enable transitive trust among people participating in the network. The pathfinder algorithm essentially detects connections along a graph of trust, thereby allowing the flow of tokens and transactions among non-trustees via intermediary trustees. The more connections an account has, the more transactions she/he can engage in.

To prevent hoarding and incentivize economic activity, Circles UBI comes with an in-built deflationary monetary policy in the form of demurrage, which is a 7% annual decrease on all Circles balances. Inflation (an increase of 24 CRC/day or 8,760 CRC/year) and deflation (7% decrease) eventually cancel each other out in the course of approximately 14 years, meaning that every account would converge to around 125,143 CRC if they did not engage in any economic activity (buying or selling with CRC). The goal of demurrage is to increase the velocity of spending and ensure that over time there is a convergence between those who own more and those who own less CRC, thereby decreasing the disparity between those who join first and those who join later. Eventually, demurrage aims to engineer a fairer circular economy.

However, the idea of each individual issuing her/his own token is problematic both technically and economically. The web of trust mechanism supported by the pathfinder algorithm is very complex and it does not work in practice. Also, the value an individual brings into the system can be subject to a misalignment of incentives like the one, for example, witnessed in the Berlin pilot that was launched in 2021 on the basis of a subsidy program designed to incentivize the circulation of CRC locally in Berlin. A certain amount of fiat money in Euro (EUR) was given as a subsidy, aiming to lower the risk on the

part of businesses that were willing to accept and use CRC as a means of payment. Yet, the Berlin pilot faced a number of hurdles that caused the Circles cooperative, which implemented the pilot, to run out of funding, end the pilot, and stop its operation as a cooperative. To prevent analogous issues in the future, Circles UBI is now working to build a user-friendly wallet, based on the idea of group currencies that would limit complexity by integrating individual value into hubs. Within group currencies, that is, a smaller number of hubs, it might be easier for organizations to agree to use CRC in more standard exchange rates. Gnosis Chain is planning to do a smart contract upgrade and change some features of the wallet, including the ability to unfreeze accounts and provide in-built native support for group currencies. Group currencies aim to enhance privacy, value creation, liquidity, and trustworthiness, thereby helping the network scale up in a decentralized and secure manner.

Methodology

The paper adopts a case study approach (Yin, 2014), since it is most suitable when exploring novel organizational models such as blockchain-based community currencies and cooperatives as in the case of Circles UBI. Data collection was based on a literature review, fieldwork, digital ethnography, participatory observation, and in-depth interviews. The first author participated in the Circles UBI open marketplace that took place in Berlin in September 2023, where he interviewed six members of businesses participating in the Berlin pilot. The first author worked together with members of the Circles cooperative in their co-working space in Berlin for 1 week, where he interviewed four co-op members and three developers (Supplementary Appendix SI, SII). Interviews lasted between 30 and 60 min. Interviews were recorded on mobile and transcribed using Descript. Additional data were gathered by accessing the online instances of Circles UBI (Supplementary Appendix SIII). Data were triangulated (Gibbert et al., 2008) and analyzed along four coding themes: value proposition, governance model, economic policy, and tech/law policy (Table 1). Following Ernesto Laclau and Chantal Mouffe's discourse analysis (2001), the four coding themes emerged as nodal points to classify discourses and practices evidenced in the Circles UBI project.

TABLE 3 Discourses and practices in Circles UBI project.

Value proposition	Governance model	Economic policy	Tech/law policy
UBI, blockchain, anticapitalism, anarchism, libertarianism, economic democracy	Direct democracy, monthly general assembly, decentralization, localism, democratic confederalism	Complementary currency, transparency, €2.3 million in donations, employee salaries	Bylaws of Circles worker cooperative Bitsposessed collective
Problem: nation-state centralized debt-based money supply and unfair capitalist distribution of money	Circles worker cooperative: two full time and eight part time employees and several freelancers	Subsidy program in EUR for businesses participating in the Berlin pilot	Gnosis Chain, open-source software
Solution: blockchain-based decentralized UBI	Executive board, core team meetings, online and in-person assembly, collective brainstorming, community hub, coordination group, working group, community reach out	Resilient localized and complementary supply chains which allow for affordable prices using CRC	Circles wallet, seed phrase, public and private key
A fair circular economy, money as a commons		Community regulated exchange rates of CRC and fiat money	Circles Safe: a smart contract that holds the keys to the accounts
Solidarity, diversity, resilience, self-sustainability		Transaction fees on Gnosis Chain are covered by Gnosis	Transparency of transactions versus privacy (Entropy project)
Change in the ethic of work		Proposed ∞ ratio between Circles credit and reserve capacity for B2B	
Berlin and Bali pilots			

Findings and analysis

In Table 3, we display the discourses and practices of the Circles UBI project articulated around four nodal points or coding themes. Next, we critically examine in detail the discourses and practices featured in the Circles UBI project.

Value proposition

Since its launch in 2017, Circles has comprised a pluriverse of different teams and projects working to apply the idea of UBI in various instances across the globe. Core values of the community have been decentralization, democratic federalism, localism, and self-sustainability. Circles' mission is to transform money and the ethic of work towards post-capitalism. Different discourses accompany this mission in the Circles community, ranging from libertarian and anarcho-capitalist to anarcho-communist ones. Some conceive of UBI covering a basic level of subsistence upon which people would be free to follow their dreams and passions. In that case, UBI would sustain a parallel economy that would be complementary and not substitutive of the capitalist economy. Merit-based systems such as capitalism should be built on top of UBI (Interviewee 1). More radical voices envisage UBI transforming capitalism into a post-capitalist economy of post-growth or degrowth that would radically alter the meaning of labor and work. In this sense, people should not be dependent on extractive and often precarious wage labor but should be free to pursue their passions as they see fit. People should have their basic needs covered and not work to survive but to flourish and thrive (Interviewee 5). By basic needs we refer here to food, shelter, education, health, human rights, care, love, sex, and so on.

This societal transformation presupposes a reversal of values away from neocolonialism, exploitation, extraction, individualism, and laborism and toward the ethics of creativity, ecology, self-sufficiency, autonomy, community, care, and mutualism (Interviewee 2). To this

end, money dissociates from the commodity fetishism of both Marxism and Liberalism, in which money represents reification and utility, respectively. Money also parts ways with the nation-state sovereign money, fiat, or credit, to empower people through mutual credit systems designed to circulate values others than profit maximization and capital accumulation (Cabaña and Linares, 2022).

Mutual credit systems point to the potential democratization of money, its creation, and its institutions—a money commons—a currency for the commons where credit is issued, co-owned, and administered by people democratically from the bottom-up rather than by state bureaucracies and banks (Cabaña and Linares, 2022).

Upon its inception, Circles UBI garnered so much attention and hype that when it launched, the servers crashed, struggling to handle the large activity. Ever since, it has been slowly growing as it maintains an active Twitter account that transmits updates and news to about 23.7 K followers at the time of writing. In February 2020, the Circles Coop was established in association with Gnosis Chain and Bitsposessed Collective⁶ to build up a flagship pilot in Berlin, aiming to apply the Circles protocol in the local economy and support similar implementations across the globe. The Circles Coop and Bitsposessed Collective help to maintain the technology and infrastructure. The Circles Coop also supports groups and businesses who want to join the network and use Circles. The team set out to onboard cooperatives, producers, and businesses that can complement each other to claim the stuff of a basic income: food, care, health, housing, etc. After the official launch in October 2020, the network grew to a worldwide entanglement of over 100,000 people. In July 2021, the Circles Coop began running a subsidy program for a group of local businesses, which allowed them to convert their CRCs into fiat (EUR). The goal of the subsidy program was to broaden the Circles network by incentivizing like-minded businesses to accept and circulate CRCs across their supply chains. The subsidy program

⁶ <https://join.bitsposessed.org/>

comprised a diversity of businesses such as bicycle sales and repairs to cooperative distribution bike fleets; yoga studios and saunas; meditation and massage practices; small farmers and local cooperative supermarkets; local shops and cooks that produce their own drinks, products, and clothing; and other service providers.

The Circles Coop, however, ran into a number of problems. Blockchain technology is not ready to support thousands of users willing to join the network. Scalability, cumbersome smart contract upgrades, and numerous bugs constantly popping up in the system made its implementation problematic in Berlin and in Bali⁷ where Circles UBI is being currently implemented (Interviewees 6, 7). Also, most businesses participating in the pilot were cashing out 90% of their CRC into EUR. Businesses were using CRC as an exit to EUR, thereby not contributing to the circulation of CRC across their supply chains (Avanzo et al., 2023). Eventually, they were doing business as usual, while oftentimes being engaged in price gouging. Businesses and merchants were raising the prices of the products traded in CRC to unaffordable levels for the community, thereby rendering those products luxury items (Interviewee 1). Encountered with the realities and contradictions of building alternatives outside the state and within the current capitalist economy, the Circles Coop ceased its operations in January 2024.

Governance model

The Circles Coop consisted of a number of employees and freelancers. The co-op held online and in-person assemblies to create spaces for collective brainstorming and sharing vision:

As a co-operative, we have to come together at least once a year in a general assembly and vote on different things. This is like the financial reports and how we would like to use the money. But this is just like the formal side of things. What we indeed do is every quarter we go into retreat for like 3 days with all the people from the co-op where we elaborate and work on strategic things. So this is kind of like a part of the governance as well, where we express ourselves and in the line on different topics [sic]. And we did this in a consensus way, consent basically, where it is not about voting against each other. And then finding a minimal viable, you know, direction. But it is really like picking up everyone on a consent basis. And in addition, what we also have is a 2-week, bi-weekly core team meeting where we then look more into the operative topics where all of the domains are presenting and addressing the topics. And the issues they have, where they need support from others. And this is also like a form of, yeah, operative governance body where we can align. Most of the people are living in Berlin, so we come together in a co-working space where we had many of the core team meetings, for example,. But since even our team is decentralized, there's people in different countries in the world, so we usually have hybrid core team meetings. A few are here in Berlin and the rest join online (Interviewee 1).

A lot of the people who work on the project are like, you know, more anarchists, and so there is always this clash between like, you know, radical horizontality and more like a vertical way of working. Overall, we managed to have, I would say generally some, you know, mostly horizontal and autonomous decision making per domain. So autonomy is a big thing. Every domain has its autonomy and they work and it is good. Like we do not, like, no one telling us what to do. But we do try to come to consensus and sort of have this type of decision making based on consent and consensus. Within the cooperative is definitely a bit more, you know, political, let's say (Interviewee 2).

In Berlin, monthly assemblies have been running since November 2020, forming different working groups to connect with different actors around the city and beyond. Applying direct democratic practices to a currency like Circles has allowed for people to join and learn about money and the importance of taking the economy into their own hands (Cabaña and Linares, 2022).

Economic policy

The co-op received more than € 2.3 million in donations, which were channeled to pay employee salaries and fund the Berlin pilot. In particular, the subsidy program in Berlin was designed to incentivize local businesses to accept and use CRC as a means of payment. Businesses were paid in CRC for their services or products. Then they sent their CRC to the Circles Coop Wallet and they were reimbursed in EUR. In this scheme and beyond, exchange rates and prices are set freely by local communities following the law of supply and demand. Businesses that accept CRC as a complementary currency can increase sales and market share and open their supply chain by participating in a more ethical, fair, sustainable, local, and resilient economy. They can lower waste by allowing surplus or idle inventory to circulate via Circles liquidity, thereby contributing to a circular economy, all the while benefiting from lower transaction and production costs in fiat money. The subsidy program, however, in the Berlin pilot failed for a number of reasons. Businesses were cashing out 90% of their CRC into EUR, eventually doing business as usual. Businesses were forced to pay bills in EUR to survive competition and market pressures rather than contributing to a basic income community (Interviewees 8, 10, 11, and 13):

They were cashing out because a) their own business model was rather fragile to start with and b) most of the partners were under financial pressure. The EUR subsidy was meant to lower their risks, but I guess there can't be any alternative economy without taking risks. I think it was not a good decision to back their expenditures with EUR instead of incentivizing to close economic loops with CRC. Another solution would be to work on business scenarios with closed loops (farmers > drivers/transport > supermarkets > restaurants > delivery, etc.) (Interviewee 4).

We were trying to onboard businesses who can then pay with CRC in other businesses or for other businesses, and to close all these loops. For the different needs of the different partners was super difficult [sic] (Interviewee 5).

⁷ <https://www.circlesubi.id/>

Tech/law policy

Circles launched in 2020 when the Ethereum network was expensive price-wise for a project like Circles, when one would pay €20 in transaction fees to buy coffee with CRC. Circles launched on XDAI, one of the few side-chains available back then. Gnosis merged with XDAI in 2021 and now Circles is one of the most important applications on the Gnosis Chain. The Circles Coop followed the bylaws of the German cooperative law and the businesses participating in the subsidy program had to comply with the German tax regulation.

Circles UBI is an open-source software, meaning the code is open and free for anyone to access, modify, and use as they see fit. The openness of the code serves decentralization and provides resilience in case of failures as in the Berlin pilot. Anyone can experiment and play with the code to create different tokenomics, different forms of money, or different models. In that case, however, CRCs will not be interlinked to be spent across different pilots such as Berlin and Bali, for example.

The technological infrastructure of Circles UBI encountered a number of challenges during its implementation:

So I think one of the main challenges is indexing the data from the blockchain and having it available. And synchronize without delay [sic]. Adding an extra layer like the indexer is subject to delays. The blockchain is the universal database. On top of it, there is the indexer, which has to run and provide the clients or the users with the data. And sometimes it depends on where it is running, the server, capacities, etc. It could cause some delays. So finding the right indexer, running in the right infrastructure, like in the right servers. And this is a challenge for all the distributed applications. Then we have the Pathfinder, which is something very specific for Circles. So given the rules that are written in the smart contracts, these rules restrict how the transfers can be made through the web of trust, and it has some calculations. For every step you have to calculate this and that. . .and extra computation is needed before you create the path. So creating this path in a way that also synchronizes or updates it with the latest state of the web of trust and the balances that are in the blockchain is also a challenge. Also, the flow algorithms to find valid paths have a challenge of scalability because when the network grows it becomes more and more complex (Interviewee 6).

With decentralized applications that run in smart contracts, if you discover a vulnerability, you will have to upgrade or migrate to a new version. And that can be tricky with decentralized systems switching to the latest. It comes with more challenges to upgrade some parts of the code. And this is also a governance problem regarding who has the power to update the smart contracts and then migrate all the balances of the people to the new smart contracts (Interviewee 7).

Following the failure of the Berlin pilot, Gnosis Chain is now working on Circles 2.0 (a decentralized stable coin) and the Entropy project⁸ that presents a solution to digital surveillance, enabling

individuals to participate in their own social networks freely and securely, without data leaking from their interactions and social relationships. The Entropy project develops zero knowledge proofs to bootstrap privacy-preserving digital payments, scale-free crypto-credit applications, anonymous trust verification (proof of humanity), and UBI (Circles UBI 2.0.) Gnosis Chain seeks to merge individualized value with group currencies (DAOs, cooperatives, businesses, local communities, and so on) to create a simpler, more secure, and user-friendly wallet that could potentially facilitate the massive adoption and use of CRC across the globe. Some also envisage CRC functioning as a local currency, for instance when it comes to claiming state services with CRC (Interviewee 4). If the municipality would step in and accept CRC as a currency for public transport, for instance, or access to swimming pools, that would make a difference.

Discussion

Empirical studies suggest that the presence of a complementary currency in a local economy reduces liquidity risk by balancing the payments systems, reduces systemic risk by stabilizing the macro economy, and enhances the local multiplier effect and velocity of circulation (Studer, 1998; Stodder and Lietaer, 2016; Dini and Kioupkiolis, 2019; Fleischman et al., 2020; Simmons et al., 2021). Yet, the occasional success of community-based exchange systems such as community currencies, mutual credit, and time banks is due to strong pre-existing relationships of trust, low fiat money liquidity, and dedicated (typically compensated) community management (Ruddick et al., 2015; Sartori, 2020; Zeller, 2020; Mattson et al., 2022). Community-based exchange systems face additional meso- and macro-level challenges such as dependencies on the surrounding financial systems, government intervention, and tax statuses. Blockchain technology has the potential to address these issues by constituting the intermediate layers of global decentralized trustless transactionality, accounting, scalability, and interoperability with legacy governmental, financial, and legal institutions. However, blockchain technology is still in a highly experimental and premature phase. It has a long way to go until it proves fully functional and reliable.

It has become evident thus far that a number of interrelated technological, political, economic, and sociological problems obstruct the implementation of Circles UBI in real-world economies and communities. To begin with, even if 8 billion people on the planet today were willing to join Circles UBI to receive UBI, blockchain technology cannot presently support it. The scalability trilemma coupled with multiple points of risk (e.g., Sybil attacks, smart contract bugs, hacks, private key vulnerabilities) requires highly skilled developers and sophisticated mathematics to render blockchain somewhat safe and applicable in real use cases (Low, 2020; Low and Mik, 2020). Perhaps distributed ledger technologies will become more secure and reliable in the future but blockchain is still replete with illicit activity, fraud, scams, bugs, hacks, and speculation and is not fit for all purposes (Papadimitropoulos, 2023). Digital illiteracy and popular mistrust in code and algorithms make people trust states and banks to hold their money. A money system such as Circles UBI cannot rely on personal responsibility alone to secure interpersonal trust and scale globally. Irrationality, biases, vested interests, malicious actors, and

⁸ <https://entropy.circles.coop/>

collusion threaten the premises of a web of trust. Thus, blockchain's technological fragility along with the flaws in Circles UBI protocol render the project of a blockchain-based UBI at least problematic. Perhaps group currencies shielded with sophisticated cryptography such as zero knowledge proofs could be a tool to enhance the use of individual tokens and scale the idea of UBI. But still, this is not enough for Circles UBI to live up to its promises, address its contradictions, and help transform capitalism into post-capitalism.

The issuance of UBI in the form of mutual credit is considered to incentivize an alternative production of goods and services in the model of a circular and anti-capitalist or post-capitalist economy just as banking credit is intended to boost the production of goods and services in the capitalist economy (Interviewee 2). Yet, redistribution mechanisms such as UBI alone are insufficient to induce structural systemic change as indicated in Circles UBI core value proposition. One cannot produce systemic change by seizing the means of exchange while the means of production remain under capitalist control. A UBI would be helpful if embedded in a holistic counter-hegemonic political strategy aiming to transform the capitalist value chain as a whole, from credit to production, distribution, and consumption. The role of the state is crucial here to help initiatives such as Circles UBI reach mainstream peer-to-peer and institutional adoption. As suggested above by members of Circles Coop in Berlin, Circles UBI could partner with local governments and work together to reach the status of a viable UBI.

We have elsewhere described in detail the role of a partner state in enabling commons-based peer production in the model of open cooperativism between civil society organizations producing material and immaterial commons - as in the case of the Circles UBI project - and ethical market entities - as in the case of the Berlin pilot - adding exchange value on top of the use value of the commons (Bauwens et al., 2019; Papadimitropoulos, 2020; 2023). The model of open cooperativism promotes the concept of the commons that resonates with the degrowth movement, aiming to reduce inequalities via redistribution mechanisms and address climate change by limiting resource and energy throughput in the economy. A model of open cooperativism would deploy copyfair licenses (Bauwens and Kostakis, 2014), shared incentives, and the commons such as UBI-inspired mutual credit systems and community currencies to forge cross-sectoral value chains and close the loops in the supply chains of cooperatives and ethical market entities that co-produce material and immaterial commons. Ethical market entities that gain access to the commons benefit from innovation spillovers and reduce production and transaction costs, thereby gaining a *coopetitive* advantage vis-à-vis closed socio-economic models.

In partnership with an enabling state, ethical market entities and civil society organizations make for a multi-stakeholder interface of open cooperativism to co-produce common goods, satisfy basic social needs, enhance social innovation, foster sustainability, and sustain a gift economy alongside a post-capitalist market. In short, open cooperativism introduces an asymmetric *coopetition* vis-à-vis capitalism through joint development and ownership models that allow a diversity of actors to pool resources and use/develop shared solutions. Contrary to the tragedy of the commons (Hardin, 1968), the model of open cooperativism induces a transvestment of capital into the regeneration of the commons, thereby resulting in the

distribution and redistribution of profits, income, and rents. Thus, the model of open cooperativism forces capitalism to adapt to post-capitalism in the long run.

Conclusion

The paper reviewed Circles UBI as an illustrative case study of implementing UBI on blockchain. The failure of the Berlin pilot showcased the technological, political, economic, and sociological problems associated with the idea of implementing UBI in real-world economies and communities. We make the case here that UBI alone, on blockchain or not, is not enough to solve the problems its proponents argue against. UBI would be helpful as a tool if plugged into a model of production embedded into a political strategy aiming to fix key problems of current societies such as gaping inequalities and climate change. We gave a snapshot here of the model of open cooperativism as a counter-hegemonic political project vis-à-vis neoliberalism. The model of open cooperativism comprises civil society organizations producing material and immaterial commons - as in the case of Circles UBI project - and ethical market entities adding exchange value on top of the use value of the commons - as in the case of Berlin pilot - enabled by a partner state through public-private-commons partnerships. The model of open cooperativism promotes the concept of the commons that resonates with the degrowth movement, aiming to reduce inequalities via redistribution mechanisms and address climate change by limiting resource and energy throughput in the economy. Ethical market entities that gain access to common-pool resources, either through co-production or contribution, gain a *coopetitive* advantage vis-à-vis closed proprietary socio-economic models. Circles UBI could plug into the model of open cooperativism as a distribution and liquidity injection mechanism to foster the transition towards a commons-based ethical and sustainable post-capitalist economy.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary Material](#), further inquiries can be directed to the corresponding author.

Author contributions

VP: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Writing-original draft, Writing-review and editing. GP: Conceptualization, Methodology, Writing-review and editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The paper has received funding for the purposes of the research program "Techno-Social Innovation in the Collaborative Economy", funded

by the Hellenic Foundation for Research and Innovation (H.F.R.I.) for the years 2022–2024.

Acknowledgments

The authors want to thank Dr. Paolo Dini for providing valuable bibliographical references.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fbloc.2024.1362939/full#supplementary-material>

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