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Blockchain entrepreneurship opportunity in the practices of the unbanked

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Abstract Two billion people in developing economies have limited or no access to formal financial services, creating cause for substantial research interest in financial inclusion as a complex multidimensional phenomenon. Digital finance technologies, including blockchain, have empowered a type of crescive entrepreneurship that seeks opportunities in relation to financially excluded individuals. This article hypothesizes that nonmonetary causal factors and informal financial practices play a major role in habits of the financially excluded, which would favor blockchain's disintermediation features over the incumbent approach. After applying fuzzy-set Qualitative Comparative Analysis (fsQCA) to determine the conditions related to financial practice and motivations that explain the absence of a formal bank account, I prescribe five sensitivities that blockchain entrepreneurs need to consider when targeting this segment. The value of this article's approach extends well beyond traditional unisystemic views for financial inclusion, as blockchain-based entrepreneurial opportunities emerge to reveal alternative forms of disintermediated financial services, which we exemplify in startups modeling informal practices. Blockchain entrepreneurship can generate semi-formal financial services that bring financial aspirations closer to people. My perspective is relevant to blockchain entrepreneurs who aim to understand the practices of the unbanked as source information for the development of innovative solutions.

1. Why blockchain entrepreneurship is a suitable solution for financial inclusion

Blockchain, the distributed ledger system that supports cryptocurrencies, currently influences the underlying structure of financial services, allowing for multiple applications such as value transfer, financing, asset acknowledgement, reduced settlement times, real-time tracking of transactions, ledger databases, information protection, and smart contracts. This variety of applications clearly indicates the existence of entrepreneurial opportunities. Over $1.4 billion were invested just in the 2013–2015 period, and more than 2,500 patents

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were filed with respect to distributed ledger-related technology although no large-scale implementation exists as of the writing of this article (World Economic Forum, 2016). More recently, the blockchain Startup Tracker developed by Outlier Ventures (2017) reported up to 1,229 blockchain-related startups.

Paradoxically, Bitcoin, the largest implementation of blockchain technology in the world, is encountering important challenges in terms of exchange infrastructure, scalability, long latency, hidden centrality (few resourceful miners can dominate), inflexibility, resource unsustainability, and lack of acceptance (Drescher, 2017; Tapscott & Tapscott, 2016), as well as being accused of vested interests in maintaining Bitcoin's high asset value (Scott, 2016).

Alternative cryptocurrencies (Altcoins) have reengineered blockchain to improve some of these drawbacks in a variety of ways: implementing different consensus algorithms, fundamentally redesigning the protocol to achieve better scalability (Back et al., 2014; Eyal, Gencer, Sirer, & van Renesse, 2016), or adopting permissioned ledger architectures wherein each network node is a trusted entity—significantly increasing transactional capacity (Hayes, 2016), but in turn sacrificing transparency and constraint capacity against powerful influencers (Mattila, 2016). Despite all these redesigns, blockchain-based protocol proposals are still far from mainstream payment systems, which can process thousands of transactions in seconds (Croman et al., 2016).

However, entrepreneurial opportunity does not lie only in cryptocurrencies and the related Bitcoin business model. Considering that financial services such as credit, insurance, or saving facilities are distinct in nature from payment services (Donovan, 2012), blockchain opportunities are derived from the technology's capacity to operate tokens that grant access to an alternative portfolio of financial services that the incumbent financial system may be unable to satisfy.

Hence, blockchain encourages a new type of inclusive entrepreneurship for the bottom of the pyramid (BoP), creating "opportunities that enhance social and economic wellbeing for disenfranchised members of society" (George, McGahan, & Prabhu, 2012, p. 663). According to some estimates, financial inclusion represents a $380 billion business (Boyle, Whitehouse, James, & Kolnes, 2015). Also, social networks and big data companies have already identified an opportunity in supporting financial transactions for underserved communities (Packin & Lev-Aretz, 2015).

Perhaps the opportunity that blockchain represents for financial inclusion resides in a particularity usually disdained by financial-sector practitioners: Blockchain's distributed architecture resembles practices that most people have adopted informally. From this perspective, scalability and efficiency turn out to be secondary, as distributed ledgers do not compete but instead fill a gap currently overlooked by the formal financial system. An appropriate appreciation of blockchain capabilities would eliminate false expectations regarding the technology's potential usefulness.

However, views on the appropriate blockchain approach for financial inclusion are diverse because technology adoption, network effects, and governance challenges require attention. To help address this conflict, I analyzed the 2014 World Bank's Global Findex database (fsQCA results included in the Appendix) and collected case information that determines informal financial behavior. In doing so, I illustrate that there are at least five relevant sensitivities relevant to the reality of financially excluded individuals, which prove to be significant for targeting blockchain entrepreneurial opportunities in financial inclusion, especially in low-income countries. These sensitivities include—but are not limited to—cash preferences, lending practices, money transfer habits, identification issues in informality, and the recognition of the limitations of the incumbent system to satisfy the financially excluded effectively.

Entrepreneurs who engage in several of these five sensitivities have implemented a sort of semi-formal solution and reinterpret formalization beyond the monolithic banking system. The analysis and data collections presented offer support for a blockchain implementation approach that departs from existing informal practices—as opposed to institutional requirements—as a convincing option for the unbanked to seek this form of financial inclusion.

Section 2 of this article describes the five sensitivities for blockchain entrepreneurial opportunity, starting with the practice and habits of the unbanked for specific financial needs, such as cash management, loans, money transfer, and identification, followed by the incumbents' restrictions when it comes to satisfying the unbanked. Concerning these needs, this section reviews informal practices from my findings and exemplifies blockchain-based startups that take these sensitivities into consideration for their financial inclusion applications. I intend to show that aspirational goals from the BoP can be satisfied if blockchain entrepreneurs understand the rationale behind informal practices and local context.

In Section 3, I highlight the role of nonmonetary causes in financial inclusion, consistently with the

five sensitivities. I also provide a framework to associate entrepreneurial opportunities in financial inclusion with the practice of the unbanked, denominated semi-formal, which blockchain-based services situate in a middle ground between informality and services offered by the incumbent financial system. Examples of startups showcased in Section 2 correspond to this category, in that they understand the informal practices and, in some cases, bypass regulations by taking advantage of the logic of platform economies.

2. Blockchain: From the practice of the incumbent to that of the informal

Although the main purpose of blockchain's complex and unscalable structure is to eliminate participation of centralized financial intermediaries due to a decentralized network of persons who act as database balance witnesses (Kaşkaloğlu, 2014), several fintech practitioners continue to argue that blockchain technology should be implemented within the existing institutional framework of a nation-state (Scott, 2016). This top-down approach fails to recognize the importance of local contexts and the practices of those who are unbanked. By assuming the viewpoint of informal contextual practices, we identify sensitivities related to financial inclusion, an approach that would offer better probabilities for entrepreneurial success for the financially excluded. Blockchain entrepreneurs should embed these sensitivities into their solutions for financial inclusion as prescriptive elements of consideration for subsequent innovative entrepreneurial endeavors in this segment.

2.1. Cash preferences

As expected, my results confirm that cash transactions are customary among financially excluded individuals, particularly in the case of payments for salaries and agricultural products, apart from bank-related accounts. In addition, informal, in-cash savings mechanisms are also preferred in the form of peer-to-peer local transaction habits. These findings suggest important challenges to blockchain entrepreneurship, as cash preferences of unbanked individuals appear to be a disincentive to the adoption of electronic money. Knowing that cash preferences and informal social networks comprise usual practices of those who are financially excluded, why and how would they transfer from a cash-based to a digital transaction system?

It has been demonstrated that mobile banking provides incentives to move from cash to a digital mobile-money economy as individuals realize its benefits in terms of theft protection, speediness, and accessibility (Donovan, 2012). This type of benefit has already proven successful in the case of Uganda, where people opt for mobile money as a safety mechanism for holding and transporting currency (Burrell, 2016). As blockchain technology piggybacks on the advantages of mobile access while potentially adding transparency, security, and accountability—in other words, trust—countries with limited banking infrastructure and, naturally, cash dependence could use blockchain technology as a safe network to hold and transfer money, especially for lump-sum wage payments, as in the case of small rural harvesters (Scott, 2016).

Other studies have found that mobile services remain cash-based and that people rely on a network of local agents for exchange purposes (Biggs, 2016), a situation that would encourage blockchain entrepreneurs to build similar networks in order to tap into this opportunity. Being sensitive to cash preferences cannot be disconnected from an appropriate understanding of the contextual elements of the population. My analysis discovers cases that combine receiving cash payments with savings in informal clubs or with third parties but that receive remittances in a bank account.

Another few cases receive cash payments for agricultural products or participate in informal saving clubs but accept salaries in a bank account. Cases that accept remittances and wage payment in bank accounts may be a counter-indicator of the difficulties in terms of access reported in this segment, which would suggest the prevalence of nonmonetary causal factors as an explanation for financial exclusion (see Section 3.1). Blockchain entrepreneurs also need to acknowledge that, when infrastructure is available, formal cash practices hybridize with informal (Burrell, 2016), a core consideration for a sensitive design of solutions in financial inclusion.

2.2. Lending practices

In a variety of circumstances, borrowing endures as a core habit of low-income groups, in that this is how expenses are financed (Collins, Morduch, Rutherford, & Ruthven, 2009). In particular, rotating savings and credit associations (ROSCAs)—wherein participants commit to a fixed payment into a communal pot and each member receives the full pot on one occasion—are common practice. Social capital becomes critical for the operation of a

ROSCA, as demonstrated in the case of Stokvel groups in South Africa (Kibuuka, 2007).

My findings emphasize the importance of relatives, friends, and private informal lenders in order to obtain financing, corroborating the strength of this practice in the segment. This indicates that the dynamics of this demographic favor disintermediated peer-to-peer local transactions over borrowing from financial institutions. This outcome confirms institutional limitations in servicing the financially excluded, although we need to acknowledge that private informal lending may lead to abusive behavior.

In specific contexts, blockchain can lower transactional costs when individuals in informal networks are exploited by local usury or led into bonded labor, as well as when formal banking is not an option. Solutions such as WeTrust (www.wetrust.io) and MoneyCircles.com employ blockchain technology to create platforms for trusted social lending circles, empowering informal practices to become inclusive, still low-cost and more reliable. The manner in which people borrow money in the BoP invites the blockchain entrepreneur to seek opportunities to design financial credit services with the potential to improve existing lending practices, accompanied by context-aware value proposition that develops around security, efficacy, and efficiency.

2.3. Transfers and remittances

Blockchain entrepreneurs need to be sensitive to the hurdles involved in money transfer and remittances. Traditional money-transfer mechanisms involve bank accounts. More recently, the use of mobile devices has eased the transfer of funds and reduced transactional costs, supposedly eliminating supply-side barriers to financial inclusion. Nonetheless, while mobile services had already reached 95% global population coverage and 3.6 billion mobile-broadband subscriptions by the end of 2016 (ITU, 2017), mobile banking continued to exhibit significant room for growth due to remaining challenges related to acceptance and lack of trust (Daştan & Gürler, 2016; Lotfizadeh & Ghorbani, 2015). Prepaid cards are also a useful alternative to facilitate money transfer; even though they resemble debit cards, the lack of ties to a bank account makes them simpler and appropriate for users in the BoP (Isaacs, 2009).

Entrepreneurial opportunity also exists in solutions that avoid the need for a bank account but mimic its function, as in the case of blockchain-enabled wallets, which are useful not only for money transfer purposes but also for related value-added services such as the purchase of merchandise as in Coins (coins.ph) or of insurance as in Bluzelle (bluzelle.com). As posed by Scott (2016), informal street vendors could collectively utilize a mutual insurance pool through a distributed ledger system, offering better security and transparency and therefore establishing greater trust.

Regarding remittances, given the large number of intermediaries and regulations involved in international transactions, which can take days to settle, fees can be prohibitive for small transactions. In this case, engagement with digital currencies becomes attractive as long as regulatory requirements remain inapplicable (Morabito, 2016).

Blockchain technology can be a cost-effective solution for remittances, as exemplified in entrepreneurial proposals such as Everex (everex.one) or Abra (www.goabra.com), in which cash-to-digital-currency peer-to-peer conversion takes advantage of the willingness of local users to store and exchange value in a digital currency. Abra is an instance wherein blockchain allows smaller disintermediated groups to operate in small and faster transactional networks, bypassing incumbent institutions in cases where the country's regulatory complexity or corruption becomes a barrier to traditional money transfer.

Network effects determine success in blockchain-based peer-to-peer money transfers. In these cases, sensitivity to local practices and context, together with the digital nature of blockchain, may prevent the last mile costs, usually incurred by incumbents (Biggs, 2016).

2.4. Identification services in the practice of informal

A total of 2.4 billion persons worldwide have no legal identity (Dahan & Gelb, 2015). Lack of identity is certainly a problem in the BoP sector, which prevents such individuals from obtaining access to institutional financial services, particularly credit. In one sense for the BoP, identity becomes a matter of local knowledge; people trust and know each other, encouraging the development of social capital with potential to lead to better individual capabilities and, consequently, inclusion.

Informal social circles can make better use of blockchain technology, in that financial identity depends on institutional reputation, not relationship (Tapscott & Tapscott, 2016). Thus, previous behavior determines future opportunities for blockchain peer-to-peer financing. This is the case of startups such as BTCJam (btcjam.com) and RepSys (regis.nu), reputation-based peer-to-peer lending services. Blockchain technology that implements

the reputation-based system may also participate in a shared economy, in which BoP peers can lend their assets to other persons (Tapscott & Tapscott, 2016).

In a different type of identification, blockchain technology can be also utilized for innovative, decentralized solutions that offer proof of existence for particular products or services based on a trusted time-stamping facility such as OriginStamp (app.originstamp.org). In the case of the requirements of banks for collateral, 'infomediaries' with a smartphone can validate assets such as livestock and render these acceptable collateral (Burrell, 2016).

Because the concept of identification becomes meaningful at the local level, blockchain entrepreneurs can facilitate small transactions, recognizing the validity of peer-to-peer reputation-based networks as a form of identification. Complementarily, entrepreneurs can make use of technologies such as ChainAnchor, an MIT initiative to provide trusted identity based on permissioned blockchain, potentially compliant with Anti-Money Laundering (AML) and Know Your Customer (KYC) regulations.

2.5. Limits to the incumbent system

Despite the fact that financial exclusion is strongly associated to the lack of bank branches and no automatic teller machine (ATM) coverage (a reality confirmed by my results), infrastructure deficit is insufficient to explain this phenomenon. In general, current financial-inclusion thinking aims to extend the boundary of the formal either to banking by more unbanked individuals or to complement the informal practices of the needy. However, this thinking overlooks practical sensitivities as well as any alternatives to the already commoditized and highly centralized banking structure.

Instances of such sensitivities usually go unnoticed by financial inclusion programs, including the sensitivity of lack of money, which has been reported as the most common reason for not having a bank account (Demirgüç-Kunt & Klapper, 2013). Lack of money leaves unbanked individuals unable to seek formal financial services. In the case of credit, individuals would be able to acquire loans if they could satisfy banks' requirements for collateral, posing a serious problem for people who either lack property or cannot benefit from legalized property registers, as De Soto (2000) has repeatedly pointed out. Even micropayments become expensive for conventional financial networks and intermediaries (Serrano-Cinca & Gutiérrez-Nieto, 2014), and conditions for beneficial microcredits remain unclear (IEG World Bank, 2014). Another example, provided by Burrell (2016) and confirmed by my findings, includes that of mobile-to-bank-account money transfer, which makes no sense for unbanked individuals because funds become inaccessible once in a bank account, requiring that users commute to remote bank branches.

Moreover, traditional financial judgment considers the unbanked an unattractive market (Serrano-Cinca & Gutiérrez-Nieto, 2014), giving rise to a claim from the BoP with respect to the banking sector of the latter's insensitivity to the varying needs of financially excluded individuals, displayed in practices such as slow and complex service requirements, disrespectful employees, exploitive bank charges, and strong inflexibility (Kibuuka, 2007).

Conversely, successful examples of financial inclusion involve a flexible regulatory framework that admits the offering of financial services by other players, such as telecommunications operators and retailers. This has been the case of M-PESA in Kenya (Mas & Radcliffe, 2011) and GCash in the Philippines (Pickens, 2009), wherein the combination of ordinary feature phones, short message service (SMS) technology, and a network of individual agents has been employed to permit payments, deposits, withdrawals, and other financial services. In Mexico, certain retail stores have been allowed to offer financial services, which together with the creation of simplified accounts by a bank branch or electronically have decreased transactional costs for financial inclusion (Alonso, Fernández de Lis, Hoyo, López-Moctezuma, & Tuesta, 2013). As demonstrated by these instances, the incumbent financial system faces important limitations in order to address the problem of financial inclusion effectively. Public policy has been successful in permitting other industries, such as telecommunications and retail, to offer financial services directly. These examples demonstrate that more entrepreneurial opportunities can be generated when steps are taken to circumvent the rigidity of the financial system. The recognition of such limits is a feature that provides the foundation for opportunities for alternative blockchain-based entrepreneurial models offering financial inclusion, which would encourage an entrepreneurial mindset that adopts the perspective of the unbanked.

3. A proposed blockchain entrepreneurship approach for financial inclusion

Why does such a large share of the world population continue to be excluded from the financial system?

The rationale for the causality surrounding financial inclusion persists in being complex and diverse, and research activity in the field has been extensive, though far from comprehensive. Blockchain technology has a unique opportunity to address this challenge if entrepreneurs understand the sensitiveness associated with the reality of the unbanked. This section provides prescriptions on suggested entrepreneurial approaches to implement context-aware blockchain solutions for financial inclusion.

3.1. Understanding nonmonetary practices: The task of the entrepreneur

In the case of countries like Mexico, while some studies explain low financial-inclusion levels with monetary variables related to high transaction costs and poverty (Peña, Hoyo, & Tuesta, 2014; Vázquez, 2015), scholars also claim that a large segment of the population decides not to make use of formal financial services. This is the case even when this segment is positioned above the poverty line and when transaction costs are sufficiently low (Alonso et al., 2013).

Even India's remarkable bank-account uptake in recent years pales when considering that 80% of the accounts that were opened did not have any transactions and that the number of loans remains low; accounts have been employed only to receive government transfers, and account holders continue to be excluded from financial services (Barua, Kathuria, & Malik, 2016).

Reluctance to use formal financial services extends beyond mere monetary explanations, a fact that may have been neglected by practitioners and institutions when designing solutions for the financially excluded. These nonmonetary factors dwell at the heart of the sensitivities explained previously, which also involve contextual singularities that render blockchain's disintermediated characteristics frugally adapted to local requirements and its disintermediated proposal potentially more sympathetic to the practices of unbanked individuals.

Hierarchical financial organizations are clearly more efficient when transactions face uncertainty; there are continuous relations between parties, and coordinated investment is necessary but incentivizes opportunism (MacDonald, Allen, & Potts, 2016). Although global expansion of the financial system and the search for economic growth have motivated players in the world's institutional framework to extend their portfolios of financial products to the unbanked, the reality is that the current financial system is poorly equipped for the task. Beyond the technology, the blockchain becomes a type of spontaneous organization with market-like properties that reacts against opportunism by coordinating a distributed group of individuals (MacDonald et al., 2016). This fact grants unique blockchain opportunities to entrepreneurs when they understand the nonmonetary factors (sensitivities) behind BoP decision making.

Distributed ledgers may not substitute for formal financial services but do complement them, considering that distributed organization is the process that sustains informality and family financing. When formal institutions refuse to provide viable solutions to unbanked individuals, blockchain startups can facilitate financing by making it legitimate, secure, private, transparent, and in accord with the contextual practices of informality. Paradoxically, by taking advantage of their peer-to-peer architecture many blockchain entrepreneurial proposals depend on evading regulatory control, as informal practices do, a situation that would encourage a new definition of formality.

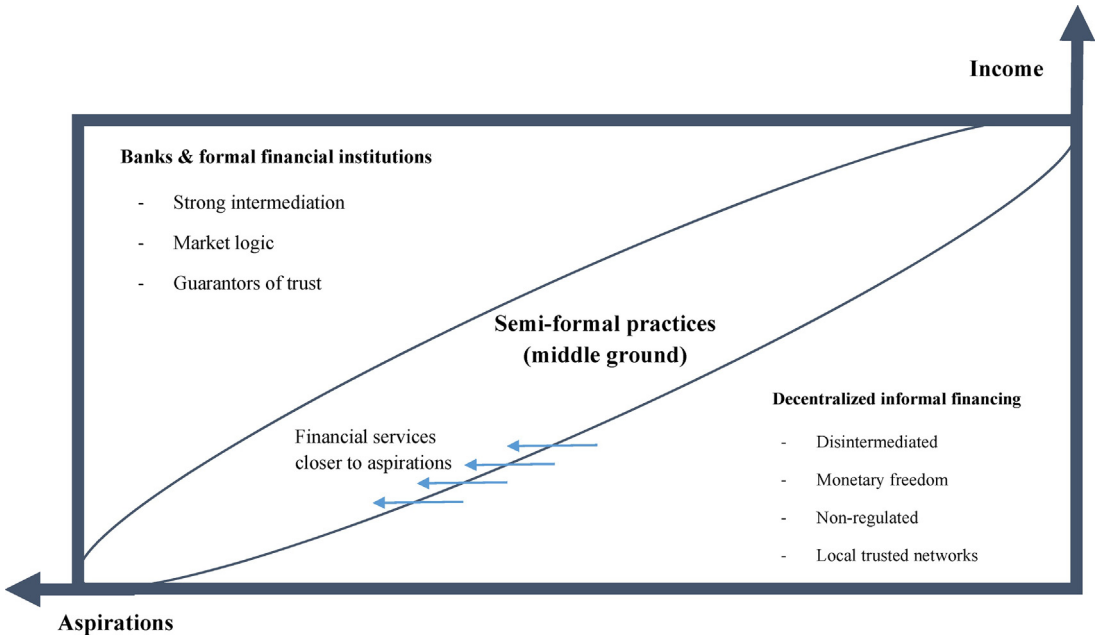
3.2. Blockchain's entrepreneurship opportunity: The semi-formal approach

While blockchain does not depend on a central authority or intermediaries, its technology offers an alternative for implementing distributed organizations aimed at automating the core, as opposed to the periphery, of the financial system (Tapscott & Tapscott, 2016). Based on this logic, this article recognizes the existence of a type of business approach that preserves people's informal peer-to-peer practices and integrates their habits into blockchain-based platforms, which would be more beneficial with public policy support and recognition. I propose that entrepreneurial models targeting financial inclusion by the adopting practices of the unbanked should correspond to a type of blockchain-based entrepreneurship, either permissioned or permissionless, which facilitates disintermediated financial practices that inhabit a middle ground between current formal financial institutions and unregulated self-organized informal services.

As Figure 1 demonstrates, a blockchain-based entrepreneurship opportunity for financial inclusion implies a sort of semi-formal financial service based on the existing habits and practices of unbanked individuals. These services may or may not accept intermediaries, but they must be necessarily legal and governed by participating peers or socially oriented organizations.

Axes X and Y in Figure 1 indicate individual aspirations and income level, respectively. To the extent that individuals increase their income levels

Figure 1. Financial-practices map based on income and aspirations



and aspirations, they would usually opt for formal financial services. In contrast, the preference for informal financial practices grows with lower income and reduced aspirations. In the middle ground, Figure 1 delineates a semi-formal area that represents an inclusion alternative located closer to the practices and aspirations of the financially excluded.

The implementation of semi-formal, blockchain-based peer-to-peer solutions for financial services surpasses the dichotomy between market and social benefits, as the entrepreneur would be empowered to seek solutions beyond the existing financial system. A process for value creation would be established, which would develop from a neglected problem such as financial inclusion. Eventually, more entrepreneurs and innovative companies would capture this value, while connected innovative financial service providers would emerge around semi-formal services.

As illustrated by my results, among the unbanked, habits leaning toward peer-to-peer interactions remain, which can be adapted by digital technologies and can encourage the participation of the digitally poor in peer-to-peer decentralized services. Built on reputation, traditional peer-to-peer trust circles can be enhanced and extended via digital technologies, particularly blockchain architecture, which would advance informal practices to higher levels of sophistication and, eventually, to the formalization pathway. Perhaps the distinction between formal and informal requires reconsideration as new technologies allow for material-value recognition and better efficacy, although not necessarily better efficiency. This is the entrepreneurial opportunity put forward by the blockchain-based disintermediated service offering. Entrepreneurs can develop new business models that end up being more achievable for the aspirations of low-income persons.

The distinction between formal and informal is antecedent to the rise of information and communications technologies (ICT), particularly mobile networks, which uncork new possibilities in terms of value storage and interactions (Burrell, 2016). As long as existing financial inclusion strategies remain closed to other forms of inclusiveness, the founding basis for informality will persist. Informal finance networks will continue to develop as a natural systemic alternative to formal financial institutions.

4. Conclusion

Current institutional proposals for financial inclusion face numerous constraints regarding user acceptance, and the problem obeys a variety of supply- and demand-related causal factors. My findings confirm that informal peer-to-peer practice is customary, even among individuals with access to a formal bank account. In summary, the rationale for informal practices that I identify—discussed as part of the five core sensitivities previously

identified for the development of blockchain-based entrepreneurship—include the following:

- Nonmonetary causal factors in explaining financial exclusion prevail as formal factors hybridized with informal practice when formal infrastructure is available.
- Cash-to-digital conversion takes place if users see advantages in terms of protection from theft, rapidity, and accessibility.
- When no points-of-presence are available, digital-to-bank-account money transfer makes no sense for the unbanked, as funds become inaccessible because users would then be required to commute.
- The unbanked receive cash payments with savings in informal clubs or third-party persons but receive remittances, salaries, and government transfers in a bank account.
- Informal savings are customary and borrowing is a core operation habit, hence the importance of relatives, friends, and private informal lenders.
- Reputation-based identification platforms can mimic local informal networks and develop better services in terms of efficacy, efficiency, and security.
- The business logic of the existing financial system renders it more difficult for formal institutions to provide suitable solutions for the unbanked, whose limitations can be overcome by blockchain-based peer-to-peer solutions.

If formalization is to be interpreted beyond the monolithic banking system, blockchain-based solutions should be implemented strategically. Public and private support would be required to legitimize disintermediated semi-formal financial services. This could be considered a temporary transition, bringing financial aspirations closer to people. The financially excluded could find new opportunities in alternative financial service platforms, especially in the least-developed economies where corruption and lack of trust separate people from formal services.

Institutional change can facilitate new forms of blockchain and context-aware entrepreneurship for alternative financial-inclusion solutions. To what extent would the bottom-up, self-organized approach find itself in the position to drive business success? How can semi-formal services be facilitated by blockchain and mobile digital platforms? Would people approve their inclusion in this type of service? How would these services merge with the existing formal offering? How can regulation be updated to support semi-formal services? These are questions that those with entrepreneurial mindsets might discover for particular financial exclusion contexts, whose contributions would aid in unearthing potential blockchain opportunities and in challenging the creativity of the entrepreneurs.

Appendix

fsQCA conditions and outcome

Access Antecedents		Borrowing Antecedents		Transactional Antecedents	
Calibrated Condition Name	Findex Series Code	Calibrated Condition Name	Findex Series Code	Calibrated Condition Name	Findex Series Code
atmper100kcal	FB.ATM.TOTL.P5	bomoneycal	WP14924_8.1	payagwcashcal	WP15185.1
bankbranchcal	FB.ATM.TOTL.P5	bo4educcal	WP14921.1	wagecashcal	WP14946.1
mobtranscal	WP15161.1	bo4healthcal	WP14922.1	savbankcal	WP15165.1
int4transacal	WP14910.1	bo4businesscal	WP14923.1	savclubcal	WP15166.1
		bofromfinincal	WP14917.1	remitbankcal	WP14937.1
		bofrominforcal	WP14920.1	payagrbankcal	WP15186.1
		bofromstorecal	WP14918.1	wagebankcal	WP14947_2.1
		bofromfamfrcal	WP14919.1		
Outcome			Findex Series Code		
paccexclcal = Calibrate (PAccExcl = 100-PAccountsMRV)			NEG (WP_time_10.1)		

fsQCA results

Model		Combinations of conditions	Coverage/ consistency
M1: Access Antecedents	paccexclcal = f(atmper100kcal, bankbranchcal, mobtranscal, int4transacal)	~bankbranchcal*~mobtranscal*~int4transacal	raw coverage: 0.43; consistency: 0.88
		~atmper100kcal*~mobtranscal*~int4transacal	raw coverage: 0.58; consistency: 0.88
		~atmper100kcal*~bankbranchcal*~int4transacal	raw coverage: 0.61; consistency: 0.92
M2: Borrowing Antecedents	paccexclcal = f(bo4educcal, bo4healthcal, bo4businesscal, bofromfinincal, bofrominforcal, bofromstorecal, bofromfamfrcal)	~bo4educcal*bo4businesscal*~bofromfinincal* ~bofrominforcal*~bofromstorecal*bofromfamfrcal	raw coverage: 0.09; consistency: 0.95
		bo4educcal*bo4healthcal*~bofromfinincal* ~bofrominforcal*~bofromstorecal*bofromfamfrcal	raw coverage: 0.12; consistency: 0.96
		~bo4educcal*~bo4businesscal*~bofromfinincal *bofrominforcal*bofromstorecal*bofromfamfrcal	raw coverage: 0.06; consistency: 0.91
		bo4educcal*bo4healthcal*bo4businesscal* ~bofromfinincal*bofrominforcal*bofromfamfrcal	raw coverage: 0.24; consistency: 0.96
		~bo4educcal*bo4healthcal*bo4businesscal* ~bofromfinincal*bofrominforcal* ~bofromstorecal*~bofromfamfrcal	raw coverage: 0.07; consistency: 0 0.99
M3: Transactional Antecedents — Run1	paccexclcal = f(payagwcashcal, wagecashcal, savbankcal, savclubcal, remitbankcal, payagrbankcal, wagebankcal)	payagwcashcal*wagecashcal*~savbankcal* ~payagrbankcal*~wagebankcal	raw coverage: 0.77; consistency: 0.97
		payagwcashcal*wagecashcal*~savbankcal* savclubcal*remitbankcal*~payagrbankcal	raw coverage: 0.21; consistency: 0.93
		payagwcashcal*~wagecashcal*~savbankcal* ~savclubcal*~remitbankcal*~payagrbankcal* wagebankcal	raw coverage: 0.11; consistency: 0.88
M4: Transactional Antecedents — Run2	paccexclcal = f(wagecashcal, savbankcal, savclubcal, remitbankcal, wagebankcal)	wagecashcal*~savbankcal*~wagebankcal	raw coverage: 0.75; consistency: 0.97
		wagecashcal*savclubcal*remitbankcal* ~wagebankcal	raw coverage: 0.20; consistency: 0.88
		wagecashcal*~savbankcal*savclubcal*remitbankcal	raw coverage: 0.21; consistency: 0.93
		~wagecashcal*~savbankcal*savclubcal* ~remitbankcal*wagebankcal	raw coverage: 0.10; consistency: 0.94

Note: * and ~ represent AND NOT logical operators, respectively. Models M1-M4 indicate the outcome as a function of combinations of conditions. Coverage and consistency parameters are also shown; only consistency values over 0.8 were selected. For all combinations, the complex solution is adopted. All values have been calibrated.

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