



BLOCKCHAIN, CRYPTOCURRENCY AND THE STATE OF FINANCIAL INCLUSION IN MOROCCO

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Abstract:

The immense potential of Blockchain and crypto-currencies is no longer a matter of doubt. These technologies have the power to revolutionize and change the landscape of many sectors, primarily finance. The advent of blockchain technologies provides a potential solution to the first three challenges of financial inclusion. In a few years, blockchain and its applications have the potential to become the "beating heart" of the global financial system as predicted by the WEF (World Economic Forum) in its report "The Future of Financial Infrastructure". All over the world, these technologies are currently considered as the new great technological revolution that could change our lifestyles and impact our economy as the internet did in the 80s and 90s and ideally give birth to a direct economy without intermediation. In Morocco, crypto-currencies are erasing borders and gaining popularity. However, the general opinion on this new innovation is not clear.

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1. Introduction

Financial inclusion has become a major priority for a growing number of countries and is becoming increasingly important. Many countries see financial inclusion as a major economic and social challenge, as it helps to address poverty, exclusion and gender disparities and promotes the economic and social well-being of people. Yet, in most countries, many people face difficulties in accessing or using appropriate financial products and services in the mainstream market.

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The advent of blockchain technologies provides a potential solution to the first three challenges of financial inclusion. In simple terms, the term blockchain refers to distributed digital ledgers (Lacity, 2018b). These ledgers use consensus protocols to create a single version of the truth. The recorded entries cannot be changed due to the encryption protocols, making the digital ledger immutable. What is posted on the blockchain can be considered as the unique and immutable truth. The first blockchain ledger was implemented by Nakamoto (2008) to support the Bitcoin electronic money system.

The advent of bitcoin has given impetus to other digital currencies like Ethereum and DogeCoin, e-wallet companies like Coin Gecko, and digital currency exchange platforms like Zaif and Mt Gox. This digital currency revolution presents a radical shift from the traditional model of monetary exchange. Raskin et al. (2019) propose a typology of digital currencies based on two axes, public versus private and centralized versus decentralized.

Decentralized private currency like Bitcoin has no central group managing it and no legal protection granted by governments. Centralized private currency is managed by companies that control not only the issuance but also the maintenance. Decentralized public money, like gold, is backed but not managed by sovereign states. Centralized public money like state money is managed by sovereign states that control its use.

Raskin et al. (2019) conclude that decentralized private money has enormous welfare implications for emerging markets as a form of investment diversification. This is especially true for economies with high volatility and policies based on the interests of the government rather than the welfare of its people (Raskin et al., 2019; Dyhrberg, 2016; Chan et al., 2019).

In an Initial Coin Offerings (ICO), cryptocurrencies are sold in the form of tokens that can be traded on the secondary market or used to exchange products and services. Adhami et al. (2018) analyze 253 ICOs that took place between 2014 and 2017.

However, entrepreneurs may be tempted to issue more tokens post-ICO, thus expropriating early token holders. Looking at 1500 ICOs that raised US\$12.9 billion, Howell et al. (2019) concludes that a digital currency with high disclosure, credible engagement, and a quality signal tends to be better received by consumers. Similarly, Roussou et al. (2018) find that the perceived safety and usefulness of a digital currency are the main factors affecting its reception by consumers and businesses, while compatibility with existing values and practices has an indirect effect on the adoption rate.

A well-designed digital currency requires (1) a real-time clearing and settlement system that allows consumers and businesses to transact efficiently, (2) safe and liquid bank accounts that earn the same rate of return as short-term government securities, and (3) a system of transfers between paper and digital money such that consumers and businesses can use paper money if they wish (Bordo and Levin, 2019).

This article is a contextual literature review. Thus, this study aims to explore the state of the art of crypto-currencies. It seeks to highlight the general opinion on digital

assets. The main motivation for this article is the absence of such exploratory studies in Morocco.

2. Literature review

Financial exclusion is a widespread problem in emerging and developed economies, preventing the poor and disadvantaged from accessing formal financial systems (Conroy, 2005).

The ubiquity of mobile connectivity and smartphone technology is opening up new business opportunities. Accumulated digital information allows financial service providers to profile each customer. This information goes beyond electronic payment records and receipts to include other digital footprints such as mobile phone records and social network traffic.

New financial intermediaries that do not accept traditional deposits and thus escape regulatory oversight have also grown rapidly. Buchak et al. (2018) evaluated that the market part in mortgage origination of these shadow banks improved from 30% in 2007 to 50% in 2015.

They find that legal and regulatory burdens can explain 60% of the growth of shadow banks, while lending technology can explain another 30%. Stulz (2019), however, is skeptical that traditional banks can be entirely replaced. Traditional banks have a large and established consumer base, offer a wide range of products, have experience dealing with regulators, and, most importantly, provide the essential service of deposit accounts backed by deposit insurance.

3. Blockchain and crypto-currencies

3.1 How the blockchain works

Blockchain, also known as Distributed Ledger Technology (DLT), is a digital system that records transactions on identical ledgers across thousands of computer network nodes that are maintained by participants or miners. Transactions are time-stamped, grouped into blocks and chained together over time to form a blockchain. The blockchain is secure because each block builds on the previous one. To modify a past block, all blocks that were created after that block must be modified. In addition, hackers will have to obtain the private keys of the thousands of nodes in the blockchain network. Thus, blockchain has the potential to displace any business activity that has low transparency and limited traceability.

3.2 Two versions of the blockchain

There are two versions of blockchain. The first is the untrusted or unauthorized blockchain, where anyone can access and update the ledger. The second is the trusted blockchain or permissioned blockchain, where certain institutions or individuals have direct access to the blockchain and are responsible for updating it. The credibility of the

permitted system is preserved by economic incentives or legal enforcement (Chiu and Koeppl, 2019).

In the untrusted or unauthorized system, miners solve "proof of work" or computational problems that have nothing to do with economic transactions. The winner of a "proof of work" competition gets a crypto-currency reward and the right to update the blockchain. The miner attaches his "proof of work" to his block before sending it to the network.

The value of the cryptocurrency depends on the credibility of the chain. Thus, miners benefit by playing the longest chain rule. Miners choose the chain by observing all previously resolved blocks to maximize their cumulative rewards. This "proof of work" blockchain protocol was proposed by Nakamoto (2008) to avoid manipulation and collusion. It guarantees that no single miner has control over the verification process.

3.3 Regulatory concerns regarding digital currencies

While digital currencies are relatively safe, transparent and fast, their rapid expansion poses a threat to existing official currencies, sovereign currencies and central bank monetary policies. Currencies like Ethereum and Libra are created by entities independent of any political authority or commercial sponsor. These digital currencies, therefore, have an autonomous dimension from fiat currencies run by central banks that are subject to political or policy objectives (Raskin and Yermack, 2016). Some argue that this autonomous feature serves as a check on the unilateral monopoly of central banks, preventing the mismanagement of the money supply (Raskin and Yermack, 2016). For a central bank, digital currencies are a source of concern (Hayek, 1976). They can lead to deleveraging of commercial banks, reinvention of credit creation and relegation of monetary policies.

A 2018 report by the European Central Bank warns that digital currencies pose problems of fraud, issuer failure and speculative bubbles (Dabrowski and Janikowski, 2018). It recommends that jurisdictions harmonize regulations to reduce these complications. The evidence shows that central banks have different responses, ranging from prohibition to tolerance to participation in digital currency innovation. Most mature economies have taken an intermediate position by allowing their use and taking a benevolent attitude (Raskin, 2013).

Some countries have developed their own central bank digital currencies. China recently announced plans to launch pilots for its digital currency as early as 2020 (Palmer 2019). Bordo and Levin (2019) believe that government-sponsored digital currency enhances the stability and prudence of a financial system by providing the central bank with an instrument that is scalable in supply and adjustable in interest rate.

3.4 Payments and financial inclusion

In the payments space, key disruptive trends include mobile payments or e-wallets, billing platforms, bitcoin wallets, blockchain-based settlement networks, cross-border crypto-currency payments, accelerated authentication of funds transfer and tracking, and

cloud-based payroll processing. These offerings make payment processes easier, faster and more direct, bypassing currency laws and regulations in different countries.

Unlike cards, e-wallets do not require point-of-sale (POS) machines or disclosure of bank account information. In 2017, the total value of transactions via e-wallets reached US\$350 billion worldwide. This is expected to reach US\$1.6 trillion by 2022 (Agarwal et al. 2019).

Of the 11 most valuable FinTech companies in the U.S. (Kauflin, 2019), seven are in the payments space, namely Stripe (worth US\$22.5 billion), Coinbase (worth US\$8 billion), Ripple (worth US\$5 billion), Circle (worth US\$3 billion), Plaid (worth US\$2.65 billion), Gusto (worth US\$2 billion), and Zenefits (worth US\$2 billion). They use fun, social, low-cost and easy-to-use interfaces to appeal to young people while supporting the unbanked and underbanked. Launched in 2011, Stripe builds software that allows businesses to accept online payments. Coinbase and Ripple, both founded in 2012, apply blockchain technology to facilitate the payment function. Coinbase is a digital currency wallet and platform where consumers can transact with new digital currencies such as Bitcoin, Bitcoin Cash, Ethereum and Litecoin. Ripple offers blockchain-based settlement for international transfers and real-time remittances.

3.5 Cryptocurrency in Morocco

Morocco has banned bitcoin and cryptocurrency transactions since 20 November 2017 (Office des Changes, 2017). The ban has met with no resistance, except from those who have stakes in the crypto-currency space in one way or another. Any existing resistance has gone unnoticed as it has been limited to a small virtual community since then. The following is an example of how people feel about the government, *"It has buried its head in the sand by focusing on vague risks and hasn't measured the benefits we could gain from bitcoin and blockchain technology to solve our country's thorny problems."*

This statement is according to Badr Bellaj, a Moroccan blockchain consultant (Jusdanis, 2017). According to the office of the Moroccan stock exchange, the reason why Morocco has banned crypto-currencies is vaguely stated. It claims that this space needs regulation and therefore the lack of it is a danger to people using crypto-currencies.

In addition, it urges people to comply with existing regulations and use accredited financial intermediaries for all kinds of transactions and remittances (Office des Changes, 2017).

Nevertheless, a few months later, Brookstone Partners, an American e, announced that it plans to build a mega wind farm project in the city of Dakhla (southern coast of the Kingdom) to generate clean energy to mine crypto-currencies (Hirtenstein, 2018).

The firm's ambition does not seem to take into account local laws regarding crypto-currencies within the Kingdom; otherwise, it may be an indication of ongoing negotiations that the general public is not aware of. The main argument supporting the legitimization of the ban for countries like Morocco is that cryptocurrencies could challenge the local currency. Since they cannot control the crypto-currency space, it is essential that they control what people use as a medium of exchange. Another argument is that if people are allowed to use crypto-currencies, fund transfers could flow through

digital assets. If so, this could reduce the inflow of hard currencies, such as the euro and the US dollar, into the country through the Central Bank of Morocco (Bank Al Maghrib), consequently decreasing the country's foreign currency reserves. Nevertheless, if a country bans crypto-currencies, it does not mean that its people cannot use them. Cryptocurrencies, especially bitcoin, have survived for over a decade mainly because they are resistant to control. No country in the world has the power to stop the transactions, and the only possible way to stop them is to shut down the internet worldwide.

Nevertheless, cryptocurrencies are still in their infancy and therefore do not pose a threat to local currencies yet. As mentioned earlier, although crypto-currencies are banned in Morocco, their use cannot be stopped. There is no practical way for a government to enforce the ban as long as people have smartphones and internet access. Anyone can be part of the public crypto-currency ledgers because no identification (ID) or registration is required. The crypto-currency network is agnostic about whether you are an animal or a human. It is a dumb network with fewer restrictions and unlimited potential. Antonopoulos (2016) expands on this point by stating that, *"Some networks are 'smart'. They offer sophisticated services that can be provided to very simple end-user devices at the "edge" of the network. Other networks are "dumb" - they offer only a very basic service and require end-user devices to be smart. The smart thing about dumb networks is that they push innovation to the edge, giving end-users control over the pace and direction of innovation. Simplicity at the center enables complexity at the periphery, which promotes the vast decentralization of services."*

Antonopoulos (2016) further provides an example of a smart network such as the telephone network. No matter how much the landline telephone device improves, there is always a restriction by the telephone cable network. Conversely, the Internet and blockchain are dumb networks, and both have the potential to accommodate the integration of any other layer of innovation. In general, cryptocurrencies and blockchain technology are still in the experimental phase, so there is little literature on the subject, especially studies that examine the effects of this innovation on society and culture. Blockchain technology is less than 13 years old as of March 2021 (i.e., since the bitcoin white paper was published in 2008). The main area of progress in this field is in computer development, which is mostly technical. Risius (2017) notes the lack of attention from researchers outside the fields of IT development as follows: *"The amount of quantitative research related to businesses beyond crypto-currencies is, however, extremely limited, and theory-based empirical research on blockchain-related phenomena is generally scarce. On the one hand, this may be due to the fact that blockchain technology is still relatively nascent in the hype cycle, and it has taken a long time for researchers outside of computer science to realize the technology's potential. On the other hand, it may be due to researchers' lack of knowledge about how to collect data for meaningful quantitative analysis in a field that has long been dominated by technical jargon and conceptual fuzziness."*

This inattention to blockchain technology may also explain why crypto-currencies are still speculative markets. Academia has yet to understand the rapid growth of the

technology and establish a sound theoretical framework for future research. The current study offers a different perspective on this technology.

This is an exploratory study that attempts to fill one of the many gaps in the literature surrounding this new topic in a very narrow geographical context. Cryptocurrencies are unstoppable. As of September 2020, 9 countries have banned cryptocurrencies. These countries are Algeria, Bolivia, Egypt, Iraq, Morocco, Nepal, Pakistan, the United Arab Emirates, and Vietnam (Library of Congress, 2020).

3.6 Challenges to solving financial exclusion

To achieve financial inclusion, four key challenges must be overcome. The first key challenge is geographical access (Varghese & Viswanathan, 2018). The second challenge is cost. Challenge 3 is about the inadequacy of financial products and services. Finally, the fourth challenge is about financial literacy.

The first problem is low eligibility for products such as formal loans (Banerjee, 2016). Due to the lack of bank accounts, collateral and financial history, the financially excluded are disenfranchised as they do not meet the formal requirements of financial institutions. While formal loans require fixed repayment plans and collateral, informal loans offer more flexibility as they are based on trust and relationships. In light of incidents in which banks miscalculate interest rates and impose repayments, the financially excluded may fear formal products (Banerjee, 2016). These citizens might be financially excluded despite physical access to banks and low costs because they are not eligible or simply prefer informal solutions.

3.7 Opportunities for financial inclusion through blockchain-based solutions

3.7.1 Addressing challenge 1: Access

Challenge 1 is addressed by the fact that blockchain is digital technology. Therefore, a financial solution based on the blockchain can be provided by mobile applications.

3.7.2 Addressing challenge 2: High cost

One of the main benefits of blockchain technology is its ability to eliminate the need for intermediaries. Since the ledger is distributed among participants and governed by a consensus protocol, third parties are not needed to facilitate transactions (Lacity, 2018).

This is an important lever to reduce transaction costs which are usually driven up by third-party fees. On the other hand, blockchain-based transactions can be facilitated with very low transaction fees. Blockchain implementations, such as Noahcoin, are helping Filipino workers in Japan to transfer money at a much lower cost than traditional banks. Another key factor is that blockchain reduces the time it takes to settle transactions. While a traditional bank transaction can take several business days to settle down, blockchain transactions can be settled in minutes, significantly reducing settlement times (Baruri, 2016). This is significant because long settlement times could discourage the acceptance of financial services when an immediate money transfer is needed. Therefore, blockchain technology can significantly reduce the monetary and time costs associated with conducting financial transactions.

3.7.3 Addressing challenge 3: Inadequate products and services

Blockchain-based solutions could offer more tailored products to customers in three ways:

- a) Digitization of existing practices,
- b) Open up new possibilities for users.

First, as discussed, blockchain enables fast and cheap transactions without the need for an intermediary. By replicating the direct and immediate nature of cash transactions, blockchain-based solutions can support the informal, peer-to-peer nature of current financial practices in Morocco. For example, they could discuss borrowing terms with their relatives informally (i.e., flexible payment terms), but use a blockchain solution to facilitate the transfer of funds. The familiar way of transacting will reduce uncertainty and fear of technology, with the direct nature of blockchain-based transactions driving the adoption of blockchain-based technologies for financial services.

Second, beyond digitizing existing practices, blockchain solves other problems. A key problem for unbanked citizens is providing credit history and collateral to lenders. Yet, because blockchain is an immutable ledger, it can serve as a reliable source of credit history. If blockchain-based solutions were adopted, even for informal transactions, the history of these transactions can provide evidence of creditworthiness. In addition, the use of smart contracts, which refer to automated transaction protocols, can provide safeguards for individual and institutional lenders, enforcing loan repayment once funds are available. For these reasons, the social lending platform Kiva is introducing blockchain technologies in an effort to help the financially excluded in Africa (O'Neal, 2018).

Finally, blockchain-based solutions would not be limited to national institutions. The ledger is being distributed among all participants. This allows access to global financial markets with a wider variety of products and services. In addition, the global nature of blockchain allows for the leveraging of global product and labor markets.

3.8 Research gaps

The study's on blockchain as a means to mitigate financial exclusion have not recognized the standing of adoption. While some studies have recognized the potential of blockchain as a grounding technology for upcoming financial inclusion initiatives (Larios-Hernandez, 2017; Swan, 2017), these studies are conceptual and do not address the actual application of a blockchain-based solution to the problem. Swan (2017) discusses the opportunities and challenges of blockchain from the government's perspective, Larios-Hernandez (2017) adopts the entrepreneurs' perspective and discusses the challenges of designing a blockchain-based solution for rural Indians. Though, none of these studies studied the adoption of a blockchain-based solution in Morocco.

4. Discussions and current context

Until recently, the situation in Morocco was not conducive to the emergence and prosperity of this technology but the situation is tending to unblock. Last year was

marked by the publication issued by the foreign exchange office prohibiting the use of cryptocurrencies. Although this statement is legally unfounded and targets Cryptocurrencies, it has sent a negative signal to players in the blockchain industry and several projects we were working on here in Morocco went into standby mode for fear that the technology would also be banned, it seems illogical but it is a truth. However, after a year, the situation has undergone a correction of trajectory. The governor of Bank Al Maghrib, confirmed recently in a press conference, that he is no longer against cryptocurrencies seeing that even the financial institutions that he takes as reference are no longer. Also, he said that blockchain and cryptos are in the charter of digitization that the bank is following for the next few years. This unlocking has brought its first fruits quickly. Bank Al Maghrib, in collaboration with our company Mchain (a start-up that acts in the field of blockchain since 2015 at the international level) and Microsoft, has set up a blockchain project, for cash management, of national scope and the first of its kind in Africa. The project will be presented at the "Blockchain Summit" conference to be held on 21 November 2019.

In the same positive direction, the authorities have allowed an international investor to set up a cryptocurrency mining project in southern Morocco. Also, the Digital Development Agency (DDA) has included blockchain in its roadmap and has announced funding to support research in this field. All these initiatives are on the right track and show the willingness to seize the opportunities presented by blockchain technology and fintech, in general, to promote the digital economy in Morocco.

5. Conclusion

Blockchain will have immense consequences for the financial system and the entire economy. This revolution is pushing several countries like Singapore and the United Arab Emirates (Dubai) to do everything to become the international center for the development of Blockchain technologies. Other African countries have taken the step to exploit these technologies, for example, Ghana uses blockchain as a land security system (land registry management). The Nigerian customs are banking on Blockchain technology for more efficiency and to fight fraud. Senegal on its side is more daring, as it aims to create a national cryptocurrency. Morocco has all the ingredients (infrastructure, human capital, technologies etc.) to succeed in the challenge and position itself as an innovative country in the blockchain. We missed the internet revolution in its early stages and we should not do the same for blockchain.

Conflict of Interest Statement

I certify that I have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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