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STUDY ON CRYPTOCURRENCIES AND CRYPTO-ASSETS IN EASTERN AFRICA

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Study on Cryptocurrencies and Crypto-assets in Eastern Africa

United Nations Economic Commission for Africa
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Abbreviations

AML/CFT	Anti-Money Laundering/Combating the Financing of Terrorism
AfCFTA	African Continental Free Trade Agreement
BBC	British Broadcasting Corporation
BIS	Bank for International Settlement
BTC	Bitcoin
CBDC	Central Bank Digital Currency
CeFi	Centralized Finance
CNBC	Consumer News and Business Channel
DeFi	Decentralized Finance
DLT	Distributed Ledger Technology
DSL	Domain-Specific Languages
ECA/SRO-EA	Sub-Regional Office for Eastern Africa of the Economic Commission for Africa
ESG	Environmental, Social and Governance
ETH	Ether
EVM	Ethereum Virtual Machine
GIZ	Gesellschaft für Internationale Zusammenarbeit
ICSOE	Intergovernmental Committee of Senior Officials and Experts
IMF	International Monetary Fund
P2P	Peer-to-Peer
PwC	PriceWaterhouseCoopers
LOC	Library of Congress
SGD	Sustainable Development Goals
SLP	Ledger Protocol

UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UNCTAD	United Nations Conference on Trade and Development
US$	United States Dollar
USDT	United States Dollar Tether

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1.0 Introduction

Gold Bitcoin and Ethereum cryptocurrency coins with candle stick graph chart, laptop keyboard

1.0 Introduction

A currency is defined as a medium of exchange for goods and services. In other words, it serves as a means of payment, a store of value, and a unit of account. It is generally issued by a government, circulated within its jurisdiction, and accepted as official means of payment in the country of issuance.

From the barter economy to the current modern economy, the currency has significantly evolved. In a barter economy, there was no physical currency. The payment for any traded goods and services was done with physical exchange with other types of goods and services. The introduction of currency replaced bartering as means of trading goods and services. At some point in time, currencies were made of silver coins, bronze coins, or gold coins. In the modern economy, currencies are made of metal coins and pieces of paper with a face value accepted by everybody. Currency in some form has been in use for at least 3,000 years[1].

Over the past decades, electronic forms of payments have replaced gradually physical or hard currencies. For example, the global use of credit and debit cards as a method of payment has almost doubled in five years, from 5% to 9% between 2012 and 2017 (Bansal et al., 2018). The development of technology with electronic payments combined with the lack of confidence in the financial system following the 2008-2009 financial crisis has pushed for a new form of currency called cryptocurrency or virtual currency. From 2008 when the first cryptocurrency was issued through the theoretical framework presented by Nakamoto (2008) to 2021, the development of cryptocurrency and its use in the economy

1 https://www.investopedia.com/terms/c/currency.asp

have been significant. According to Coinmarketcap[2], the value of all the Bitcoins in the world was over US$1.03 trillion as of November 26, 2021[3]. Based on statistics compiled by Bloomberg and published on November 10, 2021, the total value of all cryptocurrency assets has exceeded US$3 trillion from the previous peak observed in 2017 at US$800 billion[4]. From only one cryptocurrency in existence in 2009, CNBC (2022) has counted more than 19,000 cryptocurrencies as of June 3, 2022.

The increasing use of cryptocurrencies which are mostly unregulated private assets out of the control of governments and central banks poses some issues, risks, and threats to the economy and the stability of the global financial system. Few countries have started to accept Bitcoin as official currency to be circulated and used in their respective economy. To carefully manage the risks and threats posed by these cryptocurrencies, several central banks in the world have started to think about issuing their cryptocurrency referred to as Central Bank Digital Currency (CBDC). In addition, several governments (103 as of November 2022 according to the Library of Congress - LOC[5]) have directed their financial regulatory agencies to develop regulations and rules for financial institutions regarding cryptocurrencies and their use.

After the introduction of the report, the first part will focus on some definitions and generalities of cryptocurrencies and crypto-assets as well as the evolution of cryptocurrencies worldwide. The second part will review and analyse the current state of cryptocurrencies in Eastern Africa, where

2 https://coinmarketcap.com/
3 https://www.investopedia.com/tech/how-much-worlds-money-bitcoin/#:~:text=According%20to%20CoinMarketCap%2C%20the%20value,26%2C%202021.
4 https://www.bloomberg.com/opinion/articles/2021-11-10/is-crypto-really-worth-3-trillion
5 https://www.investopedia.com/articles/forex/041515/countries-where-bitcoin-legal-illegal.asp

conditions, opportunities, and challenges of cryptocurrency implementation in the region will be discussed. The last part will conclude the report by providing policy recommendations.

2. Definition and generalities on cryptocurrencies and crypto-assets

Bitcoin gold coin. Cryptocurrency and business chart in cellphone

2.0 Definition and generalities on cryptocurrencies and crypto-assets

This section of the study provides an overview and general information on cryptocurrencies and crypto-assets, particularly, the definition, the functioning, and the trend in the adoption of these virtual currencies.

2.1 Definition and functioning of cryptocurrencies and crypto-assets

2.1.1 Cryptocurrency: definition, functioning, benefits, and challenges

A cryptocurrency is a digital currency issued peer-to-peer, without the need for a central bank, and used through a decentralized computer network. Thus, it is not controlled by a single entity or a single government. There are no central banks at their head. This new monetary technology is not geographically limited because it is internet-based. It uses cryptographic technologies (the science of hiding information) and links the user to the processes of issuing and settling transactions. Cryptography secures transactions that are all verified and recorded in a public domain, ensuring both privacy and authenticity through blockchain technology.

Crypto-assets are purely digital assets that use public ledgers on the internet to prove their ownership. They use cryptography, peer-to-peer networks, and distributed ledger technology such as blockchain to create, verify, and secure transactions. They can have different functions and characteristics: they can be used as a medium of exchange, a means of storing value, or for other commercial purposes. Crypto-assets generally operate independently of a central bank, central authority, or government.

Cryptocurrencies and crypto-assets operate on a distributed public ledger called the blockchain. Blockchain is a shared, unalterable ledger that facilitates the process of recording transactions and tracking assets in a trading network. An asset can be tangible (a house, car, money, land) or intangible (intellectual property, patents, copyrights, brand). Virtually anything of value can be tracked and traded in a blockchain network, reducing risk and cost for all parties involved. Business runs on information. The faster they are received, the more accurate they are and the better. Blockchain is ideal for the dissemination of this information because it provides immediate, shared, and completely transparent information, stored in an immutable ledger that only authorized members of the network have access to. A blockchain network can track orders, payments, accounts, production, and more. Because members share a single view of the truth, everyone can see every detail of a transaction end-to-end, which builds trust and generates new efficiencies and opportunities.

Key elements in a blockchain

There are several key elements in a blockchain. These are mainly:

- **Distributed ledger technology**: All network participants have access to the distributed ledger and its unalterable record of transactions. With this shared ledger, transactions are recorded only once, eliminating the duplication of work that characterizes traditional business networks. A full description of the distributed system is provided in the box below.
- **Unalterable records:** No participant can modify or alter a transaction once it has been recorded in the shared ledger. If a transaction record has an error, a new transaction must be added to undo the error, and both transactions are then visible.
- **Smart contracts:** To speed up transactions, a set of rules, called a smart contract, is stored on the blockchain and executed automatically. A smart contract can define terms for the transfer of corporate obligations, including payment terms for travel insurance for example, and more.

Box 1: What is a distributed ledger system?

Distributed Ledger Technology (DLT) refers to the protocols and supporting infrastructure that allows computers in different locations to submit and validate transactions and update records synchronously over a network.

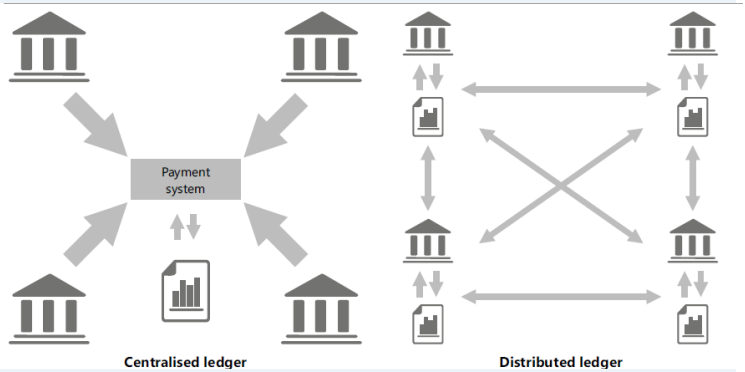
The idea of a distributed ledger—a common record of activity shared by computers in different locations—is not new.

Such ledgers are used by organizations (e.g. supermarket chains) that have branches or offices in a given country or several countries. However, in a traditional distributed database, the system administrator performs key functions necessary to maintain consistency across multiple copies of the general ledger. The simplest way to do this is for the system administrator to maintain a master copy of the ledger that is periodically updated and shared with all network participants.

In contrast, newer DLT-based systems, including Bitcoin and Ethereum, are designed to operate without a trusted authority. For instance, Bitcoin maintains a decentralized distributed database using a consensus validation procedure and cryptographic signatures. In these systems, transactions are carried out in peer-to-peer mode and broadcast to all users who try to validate them in batches called "blocks". The Activity Log is organized into separate but interrelated blocks, this type of DLT is often referred to as "blockchain technology".

Figure 1 below gives an illustrative comparison of the traditional distributed database and the new DLT system.

Figure 1: Distributed ledger system



Source: Santander InnoVentures, Oliver Wyman, & Anthemis Group (2015).

The blockchain version of DLT has successfully powered Bitcoin for several years. However, the system is not without drawbacks: it is expensive to operate (preventing double-spending without the use of a trusted authority requires transaction validators/miners to use large amounts of computing power to perform "proof of work" calculations).

These characteristics are not suitable for many applications in the financial markets. Current wholesale DLT payment applications have therefore moved away from standard blockchain technology in favor of protocols that modify the consensus process to improve privacy and scalability.

Here are some examples of protocols currently being tested by central banks: Corda and Hyperledger Fabric. Corda replaces the blockchain with a "notarial" architecture. The notarial design uses a trusted authority and allows consensus to be reached on an individual transaction basis, rather than in blocks, with limited information sharing. Hyperledger Fabric is an open source enterprise-grade permissioned distributed ledger technology (DLT) platform, designed for use in enterprise contexts, that delivers some key differentiating capabilities over other popular distributed ledger or blockchain platforms. One key point of differentiation is that Hyperledger was established under the Linux Foundation, which itself has a long and very successful history of nurturing open source projects under open governance that grow strong sustaining communities and thriving ecosystems. Fabric is the distributed ledger platform to support smart contracts authored in general and well-known programming languages such as Java, Go, and Node rather than constrained domain-specific languages (DSL).

In this sense, Fabric is accessible by most enterprises without additional training in the new DSL language as they already have the skill set in programming in Java, Go, and Node[1].

Source: Bech & Garratt (2017) and author's compilation

Functioning of a blockchain

A blockchain works in three main steps:

1. **Each transaction is recorded in the form of a "block" of data:** These blocks form a chain of data when an asset moves from one location to another or changes ownership. The blocks confirm the exact time and sequence of transactions, and the blocks are securely linked to each other, to prevent the modification of a block or the insertion of a block between two existing blocks.

2. **Each block is linked to those that precede and follow it:** Each additional block strengthens the verification of the previous block and therefore of the entire blockchain. The blockchain thus becomes inviolable, which gives it the essential strength of inalterability. Thus, any tampering by a malicious actor is impossible, and the result is a record of transactions that all the members of the network can trust.

3. **Transactions are locked in a series of blocks that form an irreversible chain called a blockchain.**

1 https://hyperledger-fabric.readthedocs.io/en/release-2.2/whatis.html

Main advantages of blockchain

The blockchain has several advantages such as:

- **Increased trust:** With a blockchain, members of a restricted network are sure to receive accurate and timely data, and their confidential blockchain records will only be shared with network members to whom they have specifically granted permission.
- **Enhanced Security:** Consensus on data accuracy is required from all network members, and all validated transactions are unalterable, as they are permanently recorded. Nobody, not even a system administrator, can delete a transaction.
- **Greater efficiency:** With a distributed ledger shared among members of a network, time-consuming data reconciliations are eliminated. And to speed up transactions, a set of rules, called a smart contract, can be stored on the blockchain and executed automatically.
- **International:** cryptocurrencies and crypto-assets can be sent around the world quickly and cheaply within the network

The main advantages of cryptocurrencies are linked to the advantages of the blockchain. This means that cryptocurrencies are trusted, secured, and efficient and can be used for cheaper and faster payment worldwide (cross-border). In Africa, cross-border transactions face some challenges, particularly as these transactions are expensive/costly and take time to operate, because payment systems are not often interconnected. These challenges represent constraints for international trade. The advantages of cryptocurrencies with fast cross-border transactions and lower costs could help Africa to boost its international

trade by facilitating payments. These issues are discussed in more detail below.

Four main types of cryptocurrencies based on their utility

Based on their utility, cryptocurrencies can be grouped into four main categories[2]. These are:

1. **Currency** like Bitcoin is used to make payments, particularly cross-border cheaper and faster payments.
2. **An asset** like Stablecoins for which the value is derived from the value of an external asset. This type of cryptocurrency is more stable and used to store value.
3. **An object like Siacom:** These types of cryptocurrencies were created to finance special projects aimed at solving the problems of the world.
4. **Meme or joke coins like Dogelon:** These were initially created strictly for fun, with no specific goal or purpose, yet they are worth millions now. They are speculative assets that work on the simple idea of community-based pumped-up trading.

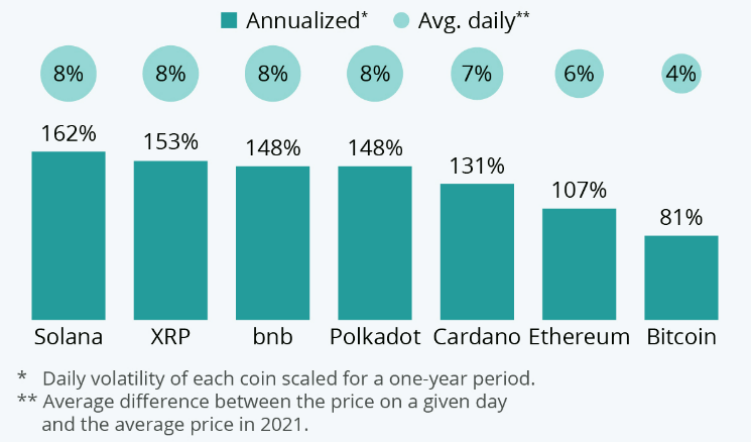
Main challenges of cryptocurrency - It remains one of the riskier assets in the market

While cryptocurrency has advantages, it presents key challenges and raises important issues. The main one is that cryptocurrency remains one of the riskier assets in the market. According to Statista statistics, the annualized volatility of the top volatile cryptocurrencies reached 162% in 2021. However, this volatility varies from one cryptocurrency to another as shown in the graph below.

2 https://www.outlookindia.com/website/story/know-the-four-types-of-cryptocurrencies-based-on-their-utility/404830

In 2021, Solana was the most volatile cryptocurrency with annualized volatility estimated at 162%. It was followed by XRP, BnB, Polkadot, Cardano, Ethereum, and Bitcoin in this order. The daily and annualized volatility of Solana is twice the volatility of Bitcoin. The graph also highlights that in 2021, the largest cryptocurrencies were also the less volatile or most stable. The recent crash of the cryptocurrency market confirms the risky nature of these assets. Indeed, from mi-November 2021 to June 2022, the cryptocurrency market capitalization lost 73.53%[3] of its value. This represents the worse crash ever observed in this market. This bear market of the cryptocurrencies has put huge pressure on crypto trading platforms which end-up with the bankruptcy of the crypto lender Celsius Network Ltd[4].

Figure 2: Top volatile cryptocurrencies in 2021

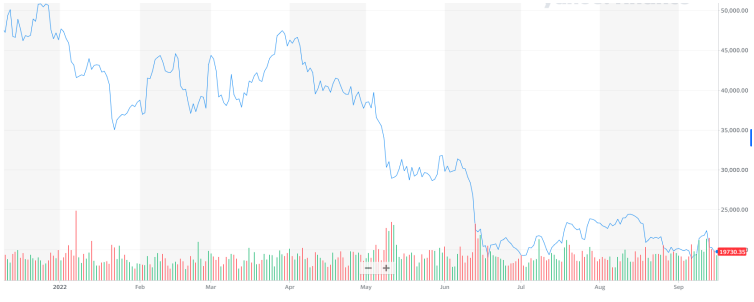


Source: Statista[5]

3 https://fr.beincrypto.com/marches/91206/bear-market-2022-pire-de-lhistoire-crypto/
4 https://www.bloomberg.com/news/articles/2022-07-14/crypto-lender-celsius-files-for-bankruptcy-in-cash-crunch
5 https://www.statista.com/chart/27577/cryptocurrency-volatility-dmo/

So far in 2022, the cryptocurrency market has been experiencing extremely high volatility in a bear market environment. This makes 2022 one of the worse years in terms of the performance of cryptocurrencies. For instance, the graph below presents the trend of Bitcoin over 2022. From 1st January to 11th May, Bitcoin's value against the United States dollar has extremely fluctuated, particularly, it fell from US$47,686.81 to US$28,936.36, and to US$ 19,701.21 on 15th September 2022. Hence, from 1st January to 15th September 2022, the lost in Bitcoin's value represents 58.6% which is the consequence of high daily volatility.

Figure 3: Trend of Bitcoin value against US$ (End 2021 to 15 September 2022)



Source: Yahoo finance

Over the same period, the Kenyan shilling also experienced a depreciation against the US dollar. The exchange rate of the Kenyan shilling moved from US$0.00883397 on 1st January 2022 to US$0.00830222 on 15th September 2022. This represents only a 6% depreciation of the Kenyan shilling compared to a 58.6% depreciation of the Bitcoin value over the same period. Definitively, these examples confirm that cryptocurrencies are quite volatile and risky assets, particularly since the beginning of 2022.

Figure 4: Trend of Kenyan shilling vs US$ from January to mid-September 2022

Source: https://www.xe.com/currencycharts/?from=KES&to=USD

Cryptocurrencies pose also operational, cyber, governance, integrity, investor protection, AML/CFT risks, and challenges to macro-financial stability (IMF, 2021). The materialization of some of these risks may cause systemic risk and lead to the destabilization of the global financial system. On top of these challenges and risks, blockchain technology requires sizable use of energy to mine cryptocurrencies and has therefore negative impact on the environment in a context where humanity is trying to reduce its energy consumption to combat climate change. This environmental risk is part of the main issues highlighted by some investors to not invest in cryptocurrencies.

In summary, cryptocurrencies and the underlying distributed ledger technology (blockchain) present many benefits and are seen as the future of finance by some investors. However, their challenges combined with the fact that they are unregulated trading assets make them relatively highly risky assets that investors need to be mindful of.

2.1.2 Central Bank Digital Currency (CBDC): definition, functioning, challenges, and benefits

The increasing use and adoption of cryptocurrencies by the population and businesses have pushed several central banks to launch or prepare to launch their cryptocurrency. Indeed, the uncontrollable rise of many cryptocurrencies, their widespread use by members of society, and their ability to evade all forms of regulation became a major concern for financial system regulators and central banks in many countries (Ozili, 2022b). Regulators and central banks had serious concerns that cryptocurrency activities will increase systemic risks in the financial system and threaten financial stability (Kim and Kwon, 2022). This threat cryptocurrencies pose to the global financial system stability is the main motivation of central banks to think about issuing their own CBDC. One of the main objectives of these CBDCs is to counter the rise of cryptocurrencies (Ozili, 2022c).

There are several definitions of CBDC in the literature. In simple terms, CBDC is the electronic form of fiat money or paper money (Ozili, 2022c). According to Mersch (2017), CBDC is characterized by two elements: (1) like banknotes in circulation, CBDC is a claim on the central bank; (2) unlike banknotes, it is digital.

Hazik (2020) provides a more detailed definition. Indeed, cash is a financial instrument and a tangible asset that has four characteristics: (i) it is anonymous; (ii) it is universal (anyone can take possession of it); (iii) it is exchanged between individuals (or "peer-to-peer", without the intervention of a central authority or the issuer) and (iv) it does not generate any interest by itself. CBDC is a digital alternative to cash that is also decentralized, but it offers

more flexibility in dealing with the other three features:

- It can be anonymous (like cash), this is the idea of token CBDC, or identifiable like account CBDC.
- It can be unlimited (universal) or restricted to a particular set of users.
- Based tokens can be public (open) or private (closed). For example, restricted to banks or financial institutions.

Kumhof and Noone (2018) define CBDC as central bank electronic money that (i) can be accessed more widely than reserves; (ii) is potentially much more functional than cash for retail transactions; (iii) has a distinct operational structure from other forms of central bank money, which allows it to potentially serve a different primary purpose; and (iv) can bear interest, paying, under realistic assumptions, a different rate than reserves. This definition makes it possible to explore the possibility of using the CBDC as a second monetary policy tool, with a price rule (where the central bank sets the interest rate on the CBDC and allows the quantity to vary) or a quantity rule (where the central bank sets the quantity of CBDC provided and allows the interest rate to vary).

There are similarities and differences between a CBDC and a cryptocurrency. One similarity between CBDC and cryptocurrency is that CBDC and cryptocurrency are both electronic forms of money. Secondly, they are both delivered on blockchain and distributed ledger technology. Thirdly, they can both be used privately to facilitate transactions where both parties agree to do so (Ozili, 2022c). In terms of differences, these are: (i) CBDCs are a broad range of digital currencies issued by central banks while cryptocurrencies are a broad range of privately issued digital assets or privately issued digital currencies (Richards, 2021; Ozili, 2022a); ii) the value of CBDCs are always pegged to a

ratio of 1:1 with the physical currency equivalent while most cryptocurrencies (except some stablecoins) are not pegged to a ratio of 1:1 with any physical currency (Klein et al., 2020); iii) CBDCs are denominated in the currency of the sovereign issuer while cryptocurrencies are not denominated in the currency of any sovereign issuer; iv) CBDCs are backed by the issuing central bank and rely on trust in the central bank or the government while cryptocurrencies are not backed by any issuer and they rely on users' trust in the software protocol that controls the system (Kiff et al., 2020); and v) CBDCs can be used as perfect money substitutes while cryptocurrencies, including stablecoins, are not perfect money substitutes because they do not have the key attributes of money: they are rarely used or accepted as a means of payment for retail purchases in everyday life, and they are not used as a unit of account and their prices are often volatile (Richards, 2021).

CBDC presents some key risks and challenges that need to be carefully managed to avoid creating systematic risk to the global financial system with their issuance. These include: i) interest-bearing CBDCs can lead to a run on bank deposits which can pose funding risks to commercial banks (Garratt and Zhu, 2021); ii) many countries have a weak digital payment infrastructure that could lead to financial exclusion for many people if CBDCs are deployed using insufficient technological infrastructure (Ozili, 2022c); iii) there is also the risk of cyber-attacks if CBDCs are deployed using a weak technological infrastructure; and iv) there is also the risk of unwarranted and inappropriate government surveillance of the CBDC transactions of individuals and corporations (Atako, 2021).

Despite these risks and challenges, CBDCs have important benefits that have been widely discussed in several papers

(Mancini-Griffoli et al., 2018; Ozili, 2022a; among others). These benefits include its potential to facilitate cross-border payments, decrease cash management costs, increase financial inclusion, and offer a relatively low transaction cost on CBDC financial transactions.

The development of CBDCs may have several implications for the survival of cryptocurrencies (Ozili, 2022c): i) CBDCs can potentially replace cryptocurrencies (Allen et al., 2022); ii) A well-developed CBDC can completely displace cryptocurrency from societies if cryptocurrency developers do not ensure a responsible and orderly development of cryptocurrencies (Ozili, 2022c); iii) CBDC adoption will lead to debates about whether a CBDC should coexist with cryptocurrency in the formal payment system through cryptocurrency regulation (Bolt et al., 2022).

2.2 Worldwide evolution and trend in cryptocurrencies and crypto-assets

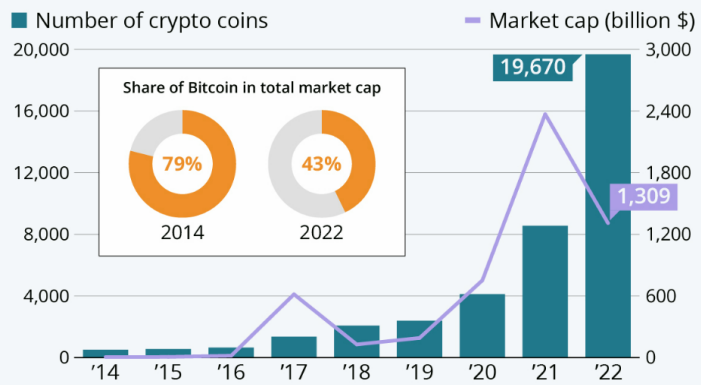
The first world cryptocurrency issued is Bitcoin in 2009. Its main goal was to make payments for cross-border transactions faster and cheaper. At the launch of the bitcoin, its value was equal to US$1 for one bitcoin. As of 16th July 2022, one bitcoin was worth US$21,262 after reaching its highest value of US$67,566.83 on November 8, 2021 (Coinmarketcap[6]). From only one cryptocurrency in existence in 2009, CNBC (2022) has counted more than 19,000 cryptocurrencies as of June 3, 2022, with a total value exceeding US$3 trillion as of November 10, 2021.

Every since the launch of Bitcoin in 2009, the rise of the cryptocurrency market has been marked by turbulence, with both major advances and setbacks. The chart below shows the evolution of the crypto economy (number of cryptocurrencies and total market capitalization) over the

6 https://coinmarketcap.com/

last decade. The growth in the crypto economy has gone through the roof in recent years, rising from only a few hundred virtual currencies at the end of 2014 to 19,670 at the end of May 2022.

Figure 5: Evolution of cryptocurrencies (2014-May 2022)



Source: Statista[7]

The evolution of the crypto economy over the last decade can be split into two regimes: Before and after the outbreak of the Covid-19 pandemic in end-2019. Although the growth in the crypto economy was significant before Covid-19, there has been an explosion in its growth since 2020. From 2014 to 2019, the number of cryptocurrencies moved from a few hundred to less than 3,000 in 2019 with the market capitalization moving from a few hundred million US dollars to nearly US$200 billion over the same period. Since 2020, there is an explosion in the growth of cryptocurrencies with the number of these virtual currencies moving from 4,000 in 2020 to 19,670 at end of May 2022. Over the same period, the market capitalization moved from US$600 billion to a peak exceeding US$3 trillion in November 2021 before crashing to US$1.3 trillion

7 https://www.statista.com/chart/27561/evolution-of-the-crypto-economy/

at end of May 2022. The explosion of the crypto economy since 2020 could be partly attributed to Covid-19 with the increasing use of online platforms to run businesses following the global economy lockdown. According to Statista[8], this is combined with the fact that there is no regulation on creating new cryptocurrency and it costs almost nothing and can be carried out in a few clicks.

Yet while their number is increasing almost exponentially, the same can't be said of their value. With an annualized volatility that often amounts to more than 100 percent, cryptocurrencies experience huge fluctuations and remain high-risk investments. After last year's boom and an all-time high of US$3 trillion reached in November 2021, market capitalization has collapsed by approximately 73% and is currently around US$1.3 trillion.

The graph above also indicates the importance of Bitcoin, once ultra-dominant in this market, its share is starting to decline in the face of the rise of other digital assets such as Ethereum. Today, Bitcoin represents between 40 percent and 50 percent of the market capitalization of all cryptocurrencies, compared to around 80 percent in 2014.

Cryptocurrency is pushing P2P transactions with DeFi (Decentralized Finance)

The development and evolution of cryptocurrencies are pushing for a new paradigm in finance. Indeed, blockchain technology, particularly distributed ledger technology, allows peer-to-peer (P2P) transactions. This means that investors can trade directly with each other without any centralized financial institution as is the case with traditional financial services. Some crypto market participants claim that decentralized solutions will gradually replace traditional

8 https://www.statista.com/chart/27561/evolution-of-the-crypto-economy/

financial services. Although it is too early to make such assertions with confidence, we can agree that an exciting competition and interaction between Decentralized Finance (DeFi) and Centralized Finance (CeFi) is taking place precisely within the cryptocurrency industry.

The main difference between DeFi and CeFi is that the former involves decentralized infrastructures, where financial services are governed by communities rather than single entities. In the CeFi, all operations are managed by a company or a consortium of companies or organizations.

According to an article drafted by Young (2020) on cointelegraph.com, from January to September 2020, the dollar value of crypto collateral locked across DeFi platforms increased by over 1200% to reach US$9 billion according to data provider DeFi Pulse.

Unlike CeFi platforms that are currently regulated in most advanced economies, DeFi platforms (as they are a new trend) are not regulated anywhere given the nature of decentralized networks. However, even though it is more difficult to impose regulation on DeFi markets, a research paper prepared by bcgplatinion.com and Crypto.com[9] concluded that the rapid rise of DeFi, which creates conditions conducive to money laundering, sooner or later will attract regulators.

Bitcoin, Ethereum, and Tether are the top 3 cryptocurrencies in existence

As of May 2022, the top 3 cryptocurrencies in terms of market capitalization were Bitcoin, Ethereum, and Tether. Their main characteristics are provided below.

9 https://cointelegraph.com/news/regulatory-risks-grow-for-defi-as-a-money-laundering-haven

Bitcoin (BTC)

Bitcoin was presented to the public in 2009 by an anonymous developer or group of developers using the name Satoshi Sakamoto. It is the first cryptocurrency to have emerged. It has since become the most well-known cryptocurrency in the world. Originally, bitcoin is a system created to replace cash with an electronic version. Thus, it is a form of payment outside the control of any person, group, or entity, thus removing the need for third-party involvement in financial transactions. Its popularity has inspired the development of many other cryptocurrencies. These competitors are trying to replace it as a payment system or are being used as utility or security tokens in other emerging blockchains and Fintechs. Bitcoin uses the SHA-256 hash algorithm to encrypt data stored in blockchain blocks. Simply put, transaction data stored in a block is encrypted to a 256-bit hexadecimal number. This number contains all transaction data and information related to blocks before this block. Transactions are placed in a queue to be validated by miners on the network. Miners in the Bitcoin blockchain network all attempt to verify the same transaction simultaneously. Mining software and hardware work to resolve the nonce, a four-byte number included in the block header that miners attempt to resolve. The block header is randomly hashed or regenerated by a miner repeatedly until it reaches a target number specified by the blockchain.

Shiny bright golden bitcoin, balanced on piles of money

The block header is “resolved” and a new block is created for more transactions to be encrypted and verified. Bitcoin was originally designed and released as a peer-to-peer payment method. However, its use cases are growing due to its growing value and competition from other blockchains and cryptocurrencies. To use your Bitcoin, you must have a cryptocurrency wallet. Wallets contain the private keys to the bitcoin you own, which must be entered when making a transaction. Bitcoin is accepted as payment for goods and services at many merchants, retailers, and stores. Physical stores that accept cryptocurrencies usually display a sign saying “Bitcoin Accepted Here”; transactions can be processed with the required hardware terminal or wallet address via QR codes and touchscreen apps. An online business can easily accept Bitcoin by adding this payment option to their other online payment options: credit cards, and PayPal, (Frankenfield, 2022a&b).

Ethereum (Ether, ETH)

People often mistakenly refer to Ethereum as a cryptocurrency, but it’s so much more than that. Ethereum is a distributed public blockchain network with smart contract scripting functionality. Although it is not a real cryptocurrency, it is powered by one. This cryptocurrency is known as Ether. Unlike Bitcoin, which was designed specifically to be a monetary unit, Ether was designed to power the Ethereum network by paying miners to perform calculations. What separates Ethereum from other blockchain applications is the EVM (the Ethereum Virtual Machine) which makes the process of creating decentralized applications simple and efficient. By enabling developers to create decentralized applications, Ethereum makes possible previously unimaginable applications of blockchain technology.

Close up shot of a silver Ethereum in a stack, among other various digital cryptocurrencies

The use of blockchain technology is no longer limited to digital currencies, it is now used in everything from electronic voting to trade finance. Hence, it is no wonder that Ethereum has, at present, the second largest market cap of any cryptocurrency (Coinmarketcap, 2022).

Ethereum and Ether do not do the same thing. Ether's uses are similar to Bitcoin and other cryptocurrencies. Ethereum is essentially a decentralized network with massive functionality. As such, it has nearly limitless applications. Here are five practical uses of Ethereum: (i) It can be used in the healthcare system to securely store and share patient information; (ii) Smart contracts can be used to conduct direct transactions without risk; (iii) It can be used to improve the current voting system by making it more transparent and secure; (iii) It can be used as a decentralized data storage facility; (iv) It can be used to create decentralized applications[10].

Ethereum can also be used to create custom blockchain networks to use in trade finance for an industry that has long benefited from digitalization. Trade finance has always involved extensive documentation and lengthy processes. Moving away from this towards digital processes, enabled by blockchain technology, could allow institutions to offer faster payments and more efficient and secure processes.

10 https://www.tradefinanceglobal.com/blockchain/ethereum/

Tether (USDT)

Launched in 2014, Tether is a blockchain-based platform designed to facilitate the use of fiat currencies digitally. As of May 2022, Tether was the third-largest cryptocurrency after Bitcoin (BTC) and Ethereum (ETH), and the largest stablecoin with a market capitalization of nearly US$83 billion. On April 5, 2022, Tether's USDT accounted for two-thirds of non-Bitcoin trade by value[11].

Tether strives to disrupt the conventional financial system with a more modern approach to money. Tether has made strides in giving customers the ability to transact with traditional currencies on the blockchain, without the inherent volatility and complexity typically associated with a digital currency. The first blockchain-based platform to facilitate the digital use of traditional currencies (a stable and familiar unit of accounting), Tether has democratized cross-border transactions on the blockchain.

Tether (USDT) is a stablecoin, a type of cryptocurrency pursuing a stable valuation. Tether is used by investors who want to avoid the volatility typical of cryptocurrencies while holding funds within the cryptosystem.

Tether tokens allow businesses (including exchanges, wallets, payment processors, financial services, and ATMs) to easily use fiat currencies on blockchains. Some of the biggest companies in the digital currency ecosystem have integrated Tether tokens. Individuals can also use Tether-enabled platforms to transact with Tether tokens.

11 Tether.to

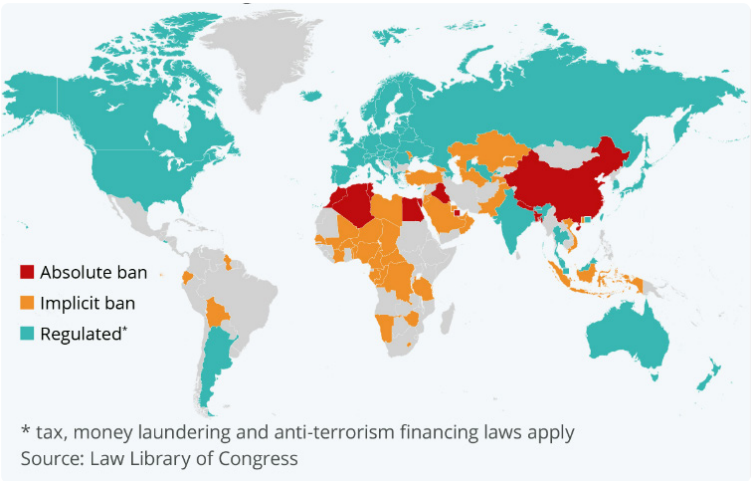
Golden cryptocurrency Tether

2.3 A general trend in the adoption and issuance of cryptocurrencies/assets by countries/central banks

2.3.1 Adoption of cryptocurrencies

This section discusses the trend of cryptocurrency adoption in the world. Adoption in this section refers to both public and/or government with an official legal framework issued to allow the trading of cryptocurrencies. The chart below shows the status of cryptocurrency adoption in the world as of November 2021. The world map on the chart is based on data collected by the Law Library of the US Congress. As we can see on the map, relatively all western and advanced economies have adopted cryptocurrencies and have put in place a set of limited regulations, particularly tax, money laundering, and anti-terrorism financing laws. In these countries, although there is no formal legal framework in place to legally authorize the use of cryptocurrencies, they are implicitly legal to issue and use. Some of these countries are exploring launching their own CBDC, we will discuss that further in sub-section 2.3.2.

Figure 6: Where the world regulates cryptocurrencies as of November 2021



Source: Statista[12]

In a few countries such as Egypt, Algeria, Morocco, Tunisia, Iraq, China… cryptocurrency is banned. However, China, part of the countries which have banned the use of cryptocurrencies was the first major economy to start issuing its national currency on the blockchain in early 2021. The country has taken a more extreme approach to regulate cryptocurrencies by issuing an absolute ban on them. According to the Law Library of USA Congress, nine countries had so far taken this measure, while many more implicitly ban the use of cryptocurrencies through their other laws. This practice of implicit ban is most common in Africa, the Middle East, and Asia. However, in these regions, some people are still using cryptocurrencies for investment and/or for cross-border transactions.

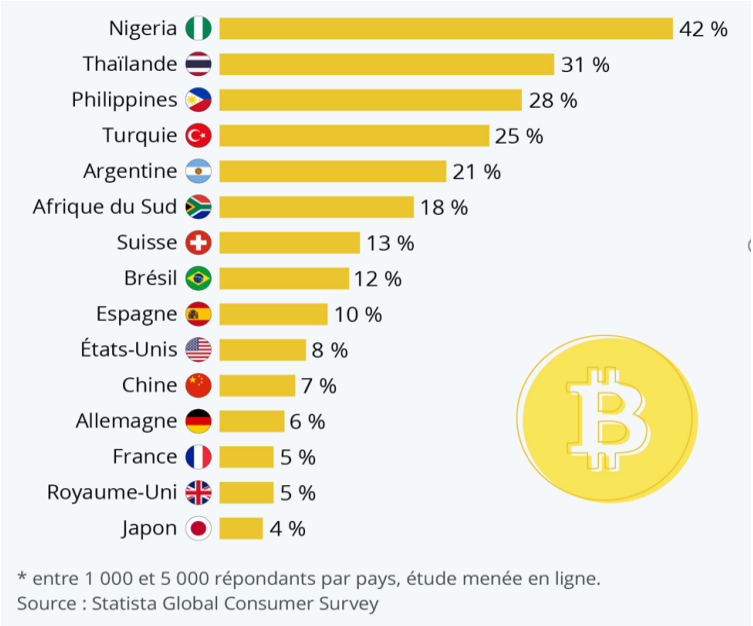
The results of a (online) survey[13] on cryptocurrency utilization conducted by Statista in 2021 are summarized in the graph

12 https://www.statista.com/chart/27069/cryptocurrency-regulation-world-map/

13 This is an online survey and might suffer from sample selection bias.

below. According to these survey results, Nigeria with 42% of the respondents who declared owning cryptocurrencies or have used these currencies is far the leading country in terms of the population using these currencies. Nigeria is followed by Thailand and the Philippines with respectively 31% and 28% of respondents that own cryptocurrencies or have used them.

Figure 7: Results of the survey conducted by Statista in 2021 on the use of cryptocurrencies (share of the respondents who own cryptocurrencies or have used them)



Source: Statista[14]

According to BBC, the position of Nigeria as part of the world leaders, in terms of cryptocurrencies used by the population, is attributed to the evolving difficult economic environment with the loss of confidence in traditional forms of investment. This happens, even though the

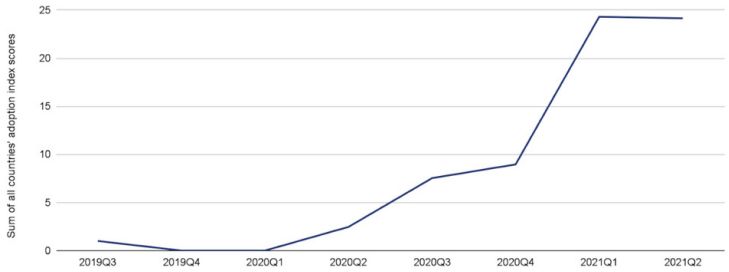
14 www.statista.com

Nigerian Central Bank has officially banned the use of cryptocurrencies and has asked all commercial banks to close all existing cryptocurrency accounts.

The results also show that there is a negative correlation between the level of economic development and the use of cryptocurrencies by the population. Indeed, on the graph above, the share of the population using cryptocurrencies is lower in developed countries than in developing countries. This result could be attributed to the fact that in developing countries, with the difficult economic situation, the high volatility of cryptocurrencies is seen by a large part of the population with a lack of financial market education, as an opportunity to make money faster compared to the traditional forms of investment. Another explanation may be that these cryptocurrencies offer their users an alternative to making cross-border payments which are sometimes difficult to make with existing national currencies.

Chainalysis has developed an index to assess the adoption of cryptocurrencies in the world. According to Chainalysis, the goal of this metric is to rank each country by total cryptocurrency activity but weight the rankings to favor countries where that amount is more significant based on the wealth of the average person and the value of money generally within the country. The evolution of this index from 2019 to mid-2021 is summarized in the graph below. It shows that there is an explosion of cryptocurrency adoption in the world since the first quarter of 2020.

Figure 8: Evolution of Chainalysis Crypto Adoption index from 2019 to mid-2021



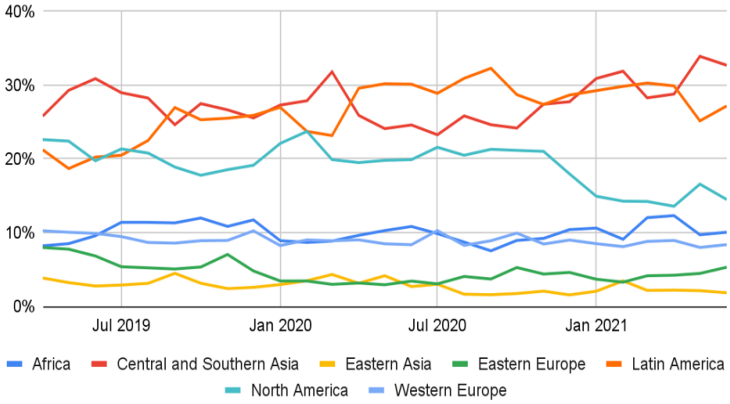
Source: Chainalysis[15]

The adoption of cryptocurrencies in emerging markets is growing, thanks to peer-to-peer (P2P) platforms. Indeed, several emerging economies, including Kenya, Nigeria, Vietnam, and Venezuela, rank high in the Chainalysis index, largely because they see huge trading volumes on the P2P platforms. Chainalysis' interviews with experts in these countries revealed that many residents use P2P cryptocurrency exchanges as their primary route to accessing cryptocurrencies, often because they lack access to centralized exchanges.

The graph below presents the trend of the share of cryptocurrency trading volume on P2P platforms from April 2019 to June 2021. It shows that Central and South Asia, Latin America, and Africa send more web traffic to P2P platforms than advanced economies, such as Western Europe and Eastern Asia.

15 https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/

Figure 9: Monthly share of all web traffic to P2P cryptocurrency platforms (April 2019-June 2021)



Source: Chainalysis[16]

Many emerging markets are facing significant currency depreciation, which is pushing residents to buy cryptocurrencies on P2P platforms to preserve their savings. Other people in these regions use cryptocurrencies to conduct international transactions, either for individual remittances or for business use cases, such as buying goods to import and sell. Many of the emerging markets represented here limit the amount of national currency that residents can take out of the country. Cryptocurrencies give these residents a way to circumvent these limits so that they can meet their financial needs. This contributes to an interesting dynamic in which P2P platforms have a larger share of total transaction volume made up of small retail payments worth less than US$10,000 in cryptocurrencies.

This approach adopted by many residents of emerging markets by using cryptocurrencies to keep the value of their savings, or to do international transactions, is similar to the economy "dollarization" of some countries in the sub-

16 https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/

region going through economic distress like hyper-inflation. The use of cryptocurrencies in these countries can be seen as complementary to "dollarization" as cryptocurrencies provide more flexibility for international transactions unlike the hard dollar used in these countries. Combining the economy "dollarization" with the use of cryptocurrencies in these countries going into economy distress like hyper-inflation or huge local currency depreciation could allow the residents to manage to preserve the value of their savings.

In summary, cryptocurrency adoption has skyrocketed over the past few years, and the variation in countries contributing to it shows that cryptocurrencies are a truly global phenomenon.

2.3.2 Adoption of Central Bank Digital Currency (CBDC)

As we mentioned above, many countries are exploring the possibility to issue their own CBDC. Among those exploring the concept are the United States, European countries, Russia, and Australia. India and Thailand, both of which are also broadly regulating cryptocurrencies, already have more concrete plans to issue their digital currencies. However, these countries will not go far as El Salvador and the Central African Republic, which are embracing cryptocurrency and where Bitcoin has been declared an official currency. China which is part of the countries which have fully banned the use of cryptocurrencies is the first major economy to start issuing its national currency on the blockchain in early 2021.

In Africa, Nigeria is the first country and among the first in the world to issue a CBDC, called eNaira. This was officially launched on 25 October 2021. The box below provides

more information on the characteristics and functioning of the eNaira.

Box 2: Case of the eNaira, the CBDC of the Central Bank of Nigeria

eNaira is a virtual currency created by the Central Bank of Nigeria. eNaira does not work the same way as Bitcoin or other cryptocurrencies. eNaira is essentially a digital version of an equally valuable paper currency, the Naira. eNaira is regulated by the Central Bank of Nigeria, which controls its value. Although eNaira, like Bitcoin, runs on a blockchain ledger which means all transactions and ownership records are stored in a decentralized computer database, only the Central Bank of Nigeria can mint, issue, distribute or destroy the eNaira. In contrast, most cryptographic "currencies", such as Bitcoin, can be created by any computer, anywhere in the world, based on an algorithm. In addition, eNaira does not offer anonymity like most cryptocurrencies. Nigerian authorities do not want unregulated and decentralized cryptocurrencies like Bitcoin to be used in the country.

According to the Central Bank of Nigeria, the main objectives for developing eNaira were to improve the availability and access to central bank money, support a resilient payments system, encourage financial inclusion, and reduce the cost of processing cash. One non-official objective of the issuance of eNaira was to kill the use of cryptocurrencies in Nigeria as Nigerians are among the main users of cryptocurrencies in the world. This has created a general trend in Nigeria's banking industry where several commercial banks started to allow residents to open cryptocurrency accounts in their institutions.

This general trend represents a threat to Nigeria's Central Bank which, in February 2022, ordered all licensed banks and financial institutions to close all accounts that transact or operate on cryptocurrency exchanges. However, some Nigerians still use these cryptocurrencies for overseas transactions.

CBDCs are different from mobile finance platforms like Orange Money, MTN Money, or M-Pesa. eNaira differs from mobile money in that mobile money is not a currency. It works like credit for a real currency. With mobile money, users buy credit, either in cash or with an online bank account that is transferred to their mobile phone account. They then send a code to the recipient's account, which can be redeemed for cash. Mobile money services are usually operated by telecommunication companies. In contrast, the eNaira is a currency, issued directly by the Central Bank. It does not function as a credit for Naira but is itself a legal tender. To access it, users need to convert Naira to eNaira. Once users have eNaira in their digital wallet, they can make transfers to other people's eNaira wallets, pay bills, or possibly convert the e-money back to cash. While mobile money services can be used from any type of mobile phone, provided it has an active phone number, it seems that eNaira users need a smartphone to download and use the digital wallet, at least for now.

Digital currencies like eNaira that run on blockchain technology are considered very secure due to the decentralized nature of the system. Advanced blockchain technology makes it difficult to falsify or duplicate digital property records. In other words, it would be much more difficult to counterfeit them. Another argument in favor of digital currencies is the speed, simplicity, and affordability of transactions.

The fact that users do not need an intermediary such as a bank or another company to carry out the money transfers for them reduces time and costs. It can also facilitate cross-border payments, including remittances. Digital currencies that are regulated by central banks, however, will not help solve exchange rate problems. Before other cryptocurrencies like Bitcoin were effectively banned in Nigeria, many people preferred to use them as the value of the Naira was weakening. The eNaira is pegged to the Naira at the official exchange rate, so it will face the same purchasing power issues. Users will also have to give up a certain degree of privacy to use eNaira. Indeed, they will have to provide a bank verification number or a national identification number to access the currency, which will allow the central bank to follow their transactions[17].

Despite some acceptance challenges, according to Amuge (2022), since its launch, the eNaira appears to have recorded some interesting results, with a steady influx of downloads. Indeed, as quoted [18], "PriceWaterhouseCoopers (PwC), the advisory and consultancy firm, in its 2022 CBDC Global Index and Stablecoin overview, ranked the eNaira as the number one global retail CBDC in the world, recording 756,000 app downloads in six months. The report further showed that the app was also downloaded across about 160 countries spanning South America, Europe, Asia, and almost all the countries in Africa.

Despite the remarkable number of downloads, the e-Naira's modest transaction level has raised concerns that actual usage by individuals across the country is in sharp contrast to active downloads…

17 https://www.bbc.com/afrique/region-59092402
18 https://www.businessamlive.com/nigerias-enaira-battles-for-survival-amid-acceptance-challenges/

They argued that due to a lack of efficient awareness and limited knowledge of digital currency operations, many Nigerians do not know the difference between the digital representation of cash deposits in bank accounts and the eNaira in digital wallets, making eNaira an unattractive exploit. The country's erratic power supply and poor internet access, especially in rural communities, were also considered hindrances to the success of the eNaira."

3.0 Cryptocurrencies and crypto-assets in Eastern Africa

Gold Bitcoin and Ethereum cryptocurrency coins with candle stick graph chart and map of African continent highliting Eastern Africa

3.0Cryptocurrencies and crypto-assets in Eastern Africa

This section of the report focuses on the state of cryptocurrencies and crypto-assets in Eastern Africa. We mainly analyze and explore the trend of uptake of these cryptocurrencies and crypto-assets in the sub-region. Conditions, challenges, opportunities, and legal and regulatory aspects are discussed and explored.

3.1 The trend of uptake of cryptocurrencies and crypto-assets in Eastern Africa

The world map presented in section 2.3 of the report shows that none of the Eastern African countries have put in place laws to officially regulate the use of cryptocurrencies. On the contrary few countries such as Kenya and the Democratic Republic of the Congo have implicitly banned cryptocurrencies although the population uses these virtual currencies. In most Eastern African countries, there is no clear guidance for cryptocurrencies. In addition, from the results of the survey conducted by Statista in 2021 on the use of cryptocurrencies, there are no Eastern African countries in the world's top users of these currencies. However, Gemini, a cryptocurrency wallet for buying, selling, and storing digital assets, unveils a report, 'Global State of Crypto 2022', which reports on the adoption of cryptocurrencies around the world. This survey is based on the testimonies of 30,000 internet users questioned, across 20 countries. According to this report, in Kenya, the adoption rate of cryptocurrencies is around 15%.

Box 3: **Sarafu,** an example of cryptocurrency used in Nairobi, Kenya

According to the website Cryptoast.fr fully dedicated to cryptocurrencies, in Nairobi, Kenya, there is a cryptocurrency called Sarafu that is in use in a limited area of the city. This is the result of the Covid-19 pandemic with its impact on the economy and poverty. Indeed, Covid-19 has had a strong impact on Kenya and the populations in the slums of Nairobi have been among the most affected. Most could no longer work and therefore could not earn money to meet their basic needs. A cryptocurrency is thus used at the local level to assist the inhabitants through aid and donation from several partner organizations such us the International Federation of Red Cross and Red Crescent Societies, the Danish, the Kenyan, and the Norwegian Red Cross, the Norwegian Government, the DOEN Foundation, the United Nations International Children's Emergency Fund (UNICEF), the World Food Programme (WFP), and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Mattsson et al., 2022).

The idea is to provide financial support to marginalized populations while encouraging the local economy. Sarafu was created by the organization Grassroots Economics (GE), which specializes in making these local currencies available. The organization adopted the blockchain a few years ago, and now offers cryptocurrencies. Sarafu is mostly used in Mukuru Kayaba, a poor neighborhood in Nairobi, Kenya's capital.

Based on BlockScience technology, Sarafu is technically a stablecoin, since one unit is always worth one Kenyan shilling. Many Kenyans have signed up on the platform and received 400 Sarafus in return, enabling them to purchase otherwise inaccessible goods and services.

This virtual currency (1 Sarafu roughly equals 1 Kenyan shilling although it is not fully convertible) can only be spent at neighborhood merchants. Only a phone number is needed to pay and receive money. Upon registration, each person receives the equivalent of 30 cents euro to start trading. An interest of 2% calculated on the balance of the users is charged each month, then redistributed to all users in pro rata of the number of transactions performed on the platform. Therefore, the more users trade in Sarafu, the more they receive. A way to provide them with a basic income. The inhabitants can thus exchange their goods and services without depending on the national currency[1]. The currency management in the Sarafu system includes: i) disbursing Sarafu tokens to new users, ii) sending a bonus to those who verified account information with GE staff, iii) rewarding the first transaction in Sarafu with a new user, iv) rewarding high levels of transaction activity in Sarafu, v) penalizing large balances held in Sarafu, and vi) promoting wider use of Sarafu.

The use of Sarafu cryptocurrency in Kenya has crossed the border of the initial communities. From January 2020 to 15 June 2021, the number of registered accounts grew from 8,354 to around 55,000 representing a 558.4% increase over the period for a total of 300 million Sarafu or US$2.8 million transactions for purchases, transfers, and participation in local savings and investment (Mattsson et al., 2022).

From the above discussion, Kenya seems to be the leading country in Eastern Africa in terms of the population adopting cryptocurrencies.

1 https://www.rfi.fr/fr/podcasts/afrique-%C3%A9conomie/20210927-le-sarafu-une-cryptomonnaie-sociale-pour-stimuler-l-%C3%A9conomie-locale-au-kenya

A review of publicly available information shows that so far none of the Eastern African countries has already launched their own CBDC. However, few countries in the region have already shown interest in a CBDC. Countries such as Kenya, Tanzania, and Uganda have indicated an interest in issuing a CBDC (Ozili, 2022c). Eastern African countries that have not decided on whether they will issue a CBDC include Rwanda and Djibouti. The factors responsible for the low interest in CBDC among the region's central banks include low smartphone penetration, lack of political support for central banks to issue a CBDC, the underdeveloped payment system, widespread weak digital literacy, refusal of merchants to accept digital payments, increased cyber-attacks on existing technological infrastructure (Ozili, 2022a).

3.2 Conditions necessary for cryptocurrencies to be harnessed for business development and/or development financing and financial inclusion

Cryptocurrencies and crypto-assets can improve financial inclusion by allowing the population with limited or no access to the national banking industry to access financial services. This can also support the development and the financing of businesses. Indeed, by facilitating national and cross-border transactions, cryptocurrencies can allow businesses to easily attract international financing to develop their activities. In addition, businesses can leverage cryptocurrencies to develop an international market through e-commerce.

However, there are necessary conditions that need to be met to benefit from these advantages offered by cryptocurrencies. As an electronic currency, the development and the use of cryptocurrency require good

technology infrastructures. As such, the basic conditions necessary for cryptocurrency development in the region are largely linked to technology infrastructures such as high-speed internet, smartphone, mobile connection, viable and robust electronic payment systems, and servers. These have been described in detail by Ozili (2022d) and they include but are not limited to:

- **Technology devices:** Users of cryptocurrencies (customers and businesses) need to have a digital device, e.g., a mobile phone, a smartphone, a laptop, or a computer, that permits the transmission of electronic information or instruments.
- **Electronic payment system:** Businesses connect to available robust and secured electronic payment system that enables them to receive payments in cryptocurrencies and other digital payment means. This requires that retail agents and businesses can connect to communication infrastructure. Retail agents can transmit and receive financial transaction details which enable customers to easily convert cash into electronically stored value and transform stored electronic value back into cash.
- **Additional financial services:** This refers to the add-on financial services offered to customers by banks, non-banks, or financial technology companies. They include credit products, saving products, insurance products, investment products, mortgage products, and risk management services.
- **Digital transactional platforms:** These are the interfaces that connect the client with the financial institution offering specific financial services.
- **Other technology infrastructures:** Backend servers and high-speed internet connections are also key. Backend servers refer to infrastructures that store data and electronically validate clients'

information before permitting digital financial transactions to take place. The backend server communicates with the frontend. It sends and receives information to be displayed on the frontend user interface. High-speed internet connections for clients and businesses are also key to allowing them to connect easily with payment systems.

- **Acceptance of merchants of these currencies:** Domestic merchants need to accept cryptocurrencies as a medium of payment.
- **Education and training:** Issuance of cryptocurrencies and crypto-assets requires in-depth knowledge of blockchain which is a highly advanced innovative technology. Eastern African countries need to improve blockchain knowledge dissemination through their training and education system to develop talent in this field. This is a key condition to take full advantage of distributed ledger technology.

To take advantage of cryptocurrencies and crypto-assets benefits for financial inclusion and business development, Eastern African countries need to develop a pan-regional strategy to work on these necessary conditions to leverage blockchain technology and develop their cryptocurrencies and crypto-assets economy.

3.3 Potential benefits and demerits of cryptocurrencies and crypto-assets in the region

The benefits and the demerits of cryptocurrencies and crypto-assets in the East Africa region are linked to their global advantages and challenges. For Eastern African countries, these benefits include but are not limited to the following:

- **Improvements to cross-border payments.** Cryptocurrencies and crypto assets have the potential to streamline cross-border payments by using new technologies and introducing simplified distribution channels.
- **Improvement in financial inclusion** with an increasing share of the population having access to financial services. Promoting financial inclusion—particularly for economically vulnerable households and communities—should be a priority for Eastern African countries. Private-sector electronic transaction accounts facilitate access to digital payments, enable rapid and cost-effective payment of taxes, enable rapid and cost-effective delivery of wages, provide a secure way for people to save, and promote access to credit.
- **Development of e-commerce** with enlargement of local businesses' market as local enterprise can easily connect to online payment platforms with reduced transactions cost.
- **Ease of international capital flows** as with cryptocurrencies/crypto-assets, there is no constraint or barrier for international capital flows. Indeed, in most Eastern African countries, to properly manage the exchange rate of their local currency through the management of their reserves, there are some constraints set to limit capital outflows. As cryptocurrencies are out of

the control of the region's central bank authorities, capital outflows through cryptocurrencies do not face such constraints.

- **Encourage digital financial transactions:** payments, transfers, savings, credit, insurance, and investments.
- **Lower cost of financial transactions** which will lead to improvement in financial inclusion.

As discussed in section 2 of the report, cryptocurrencies present several challenges linked to the fact that they are private unregulated currencies and highly volatile. These challenges translate into several demerits for Eastern African countries. These include, but are not limited to the following:

- **Highly risky assets** as currently most of the cryptocurrencies in circulation are speculative assets. An increasing share of the population in developing countries such as Eastern African countries is massively investing online in cryptocurrencies through platforms that are not regulated in these countries. There is a high risk that the population who invest in cryptocurrencies may face severe losses that can create a social crisis similar to some crises created in many African countries several years ago with losses observed by people who invested in Ponzi investment schemes. This is consistent with the recent call of the UN's trade and development body, UNCTAD[2], for action to curb cryptocurrencies in developing countries to avoid financial, economic, and social risks.
- **Lack of investor protection.** As cryptocurrencies are not regulated and the platforms that trade these currencies are not locally regulated, there is no protection for local investors who can lose all

2 https://news.un.org/en/story/2022/08/1124362

their investments without any recourse.

- **Personal data protection issue.** Personal data protection is a key issue with Fintech in general. Without any regulation, cryptocurrency trading platforms could not develop rules to protect the data of people who use these platforms. This represents a serious issue that exposes cryptocurrency users in these countries.
- **Safety and stability of the financial system,** as well as operational, **financial integrity**, and **cybersecurity risks.** Cryptocurrencies represent a source of risk for the destabilization of the financial system of the East Africa region if poorly managed and regulated.
- **Anti-money laundering and terrorism financing (AML/CFT) issues.** As there is no AML/CFT regulation in these countries for cryptocurrency trading platforms, these can be used by criminals and terrorists to transfer and manage money to finance criminals and terrorism activities.
- **Macro-financial issues,** particularly the fact that the international reserve of the countries could not be easily managed as most of the international transfers or transactions are not easily traceable by central banks.

Cryptocurrencies and crypto-assets have several benefits that could help Eastern African countries to improve financial inclusion, business financing, and economic development. However, they also have demerits and challenges that can outweigh the benefits if the necessary conditions are not in place. One avenue for Eastern African countries to overcome some of the challenges listed above is to explore the possibility to issue a CBDC.

3.4 Opportunities and challenges to harness private capital development facilitation through sustainable development financing in the region

Climate change and social responsibility issues have led to the definition of new investment paradigms. Broadly speaking, these refer to any investment strategies that combine financial return objectives, social/environmental concerns, and sustainability objectives. For such types of investments, not only financial returns matter but also Environmental, Social and Governance (ESG) factors are taken into consideration when analyzing investment projects. In this regard, the Sustainable Development Goals (SDGs) have been developed to transform the world.

More and more financings are attracted by the implementation of the SDGs with more and more green investments. In 2013, that amount was estimated at approximately US$331 billion of which only 4% was invested in sub-Saharan Africa (Buchner et al., 2014). East African countries like most developing countries struggle to attract a significant share of this type of investment and capital flow. According to Convergence[3] data, between 2005 and 2018, 440 blended investments were recorded in the world for which only one-third (140 deals) targeted the least developed countries.

Cryptocurrencies and crypto-assets provide some benefits that could be leveraged to facilitate private capital flows through sustainable development financing in the region. These benefits are linked to the fact that cryptocurrencies facilitate international money transfers without facing any capital control imposed by central banks to manage their reserves and the stability of their currency. In addition, the efficiencies brought by cryptocurrencies and crypto-assets

3 Convergence is the global network for blended finance.

could help investors when investing abroad in sustainable development projects.

However, as discussed in the previous sections of this report, cryptocurrencies and crypto-assets pose several risks and challenges that remain valid for sustainable development financing. Among these, are AML/CFT, cybersecurity, investor protection, and personal data protection issues, as well as the risky nature of these assets. These constraints and risks should be carefully addressed through the implementation of a sound and proper legal and regulatory framework to take advantage of these currencies' benefits.

Besides the financial sector-specific applications, the blockchain technology underneath the cryptocurrency development can be used to address other development issues. As with any technology, blockchain can be applied in solutions that contribute to the achievement of the SDGs in many other areas, such as healthcare, education, etc.[4] Those innovative projects in the region can attract international financing as well.

Overall, cryptocurrencies, crypto-assets, and the underlying blockchain technology represent great opportunities to facilitate sustainable development financing. In addition to the design of a global sustainable development project framework to attract a significant share of private capital flows, Eastern African countries can also leverage the benefits provided by cryptocurrencies and the related blockchain technology to facilitate sustainable development financing in the region. However, as the development of these currencies poses several challenges, Eastern African countries should be careful and should start to address these issues through the implementation of a clear legal and regulatory framework for these virtual currencies, these issues are discussed in the following section.

4 UNCTAD (2021)

3.5 Legal and regulatory issues and framework around cryptocurrencies and crypto-assets in the region

Cryptocurrencies present many challenges to national regulators. If poorly regulated, they can lead to the destabilization of the financial system as they constitute parallel online circulation of private currencies. The authorities need to carefully think about the right legal and regulatory framework for these currencies. This is a very sensitive matter. This is why, so far, no country in the world has been able to issue a full formal legal and regulatory framework to regulate these currencies. In developed countries, essentially taxes and AML/CFT laws have been set to regulate cryptocurrencies and crypto-assets. The legal and regulatory issues related to cryptocurrencies and crypto-assets include but are not limited to the following:

- Challenges in developing strong anti-money laundering (AML) laws;
- Challenges in developing laws to counter the financing of terrorism;
- Regulatory loopholes in the regulation of e-money and digital currencies;
- Consumer protection (personal data and investment protection) issues;
- Weak payment system regulation;
- Electronic Money and Electronic Fund Transfer regulation: Money circulation in an economy is strictly regulated to ensure consistency between real production and money in circulation; consequently, there should be rules and laws in place to regulate the use of cryptocurrencies and crypto-assets as a medium of payment.

According to the World Bank's Fintech regulation database, so far, none of the Eastern African countries has issued rules and laws to regulate the use of cryptocurrencies and crypto-assets. However, for all these countries, cryptocurrencies are implicitly banned. Despite this, there is an increasing share of the population that trades these cryptocurrencies through online platforms without any regulatory enforcement. This poses important risks and challenges to these countries. To maintain the financial system stability as well as socio-political stability, public decision-makers and their development partners should conduct further research on the potential impacts of excessive usage of cryptocurrencies by the local population. These studies should recommend a comprehensive appropriate approach and related legal and regulatory framework that need to be implemented to manage the risks related to cryptocurrencies and crypto-assets in the region.

3.6 Role of cryptocurrencies in promoting intra-regional trade in goods and services in the context of the AfCFTA

The African Continental Free Trade Agreement (AfCFTA) is undoubtedly great news for Africa. Access to new markets, improved trade links, and increased integration are just some of the few benefits that come with the new continent-wide free trade agreement. However, to ensure the agreement reaches its full potential, there is an urgent need to address some of the longstanding issues that have hindered the growth of trade across the continent[5].

Most African countries, and particularly Eastern African countries, have their own currency. To manage their reserves, and in turn the stability of the currency, there are several rules in place to limit the use of the reserves and the

5 https://www.africaoutlookmag.com/industry-insights/article/1128-can-cryptocurrencies-make-the-afcfta-more-efficient

mobility of capital out of the country. These rules constitute constraints and limits to the success of AfCFTA. On top of these central banks' constraints, other constraints within the banking industry do not facilitate African cross-border payments. All these constraints limit intra-regional trade in goods and services.

As Eastern Africa moves into this new era, businesses require an effective way to trade goods. In the absence of an official continent-wide currency, cryptocurrencies offer a viable means of exchange. The wide variety of coins means businesses have different options to choose from to suit their unique needs. Hence, in the context of AfCFTA implementation, to take advantage of this agreement and increase intra-regional trade in goods and services, it is key to facilitate the payment process across the East Africa region and the continent. With the increasing adoption of cryptocurrencies in the world and the region, the advantages of these currencies can be leveraged to facilitate cross-border transactions. Indeed, cryptocurrencies have three main advantages which are: i) there are secured; ii) they provide greater efficiency by eliminating time-consuming data reconciliations, and speed up transactions that are executed automatically; ii) they are international and can be sent quickly around the world. The adoption of cryptocurrencies or Central Bank Digital Currencies in the region can fast-track and secure cross-border payments. Consequently, cryptocurrencies can address some of the current issues related to cross-border payments and transactions, which will definitively help to improve intra-regional trade in goods and services.

Cryptocurrencies offer an alternative to the current financial system, with lower barriers to entry and a more inclusive system that is designed to work for everyone. The traditional banking system's cost structure often makes

it prohibitive to acquire informal businesses, whereas an open financial system that anyone can access, in theory, makes it economically viable to do so. As a decentralized platform open for anyone to use, cryptocurrencies fit right into this mold and can help with the major issue of financial inclusion across the continent. After all, incorporating the informal sector into the AfCFTA not only helps these businesses directly but supports the wider growth of their countries' economies.

In addition, the development of intra-regional trade in goods and services can be achieved through e-commerce which can be improved with cryptocurrencies serving as means of payment.

In summary, the adoption of cryptocurrencies or CBDCs within a sound legal and regulatory framework can address several constraints of cross-border transactions in the region. In this regard, with the implementation of AfCFTA which removes most of the tariff and non-tariff barriers, cryptocurrencies by addressing obstacles related to the payment process could definitively boost the intra-regional trade in goods and services.

4.0 Conclusion and recommendations

Bitcoin cryptocurrency price trading platform

4.0 Conclusion and recommendations

The development of technologies with electronic payment systems combined with the reduced confidence in the global financial system following the 2008-2009 financial crisis has pushed for a new form of currency called cryptocurrency or virtual currency. Cryptocurrencies have shown significant evolution since the launch of Bitcoin, the first cryptocurrency, in 2009.

Since the outbreak of the Covid-19 pandemic which led to an economic lockdown and the use of online platforms for remote work, there has been an explosion in the growth of this type of currency. Indeed, the number of these virtual currencies has moved from 4,000 in 2020 to 19,670 at end of May 2022. Over the same period, the market capitalization moved from US$600 billion in 2020 to a peak exceeding US$3 trillion in November 2021 before crashing to US$1.3 trillion at end of May 2022.

The rapid development of these cryptocurrencies with their underlying blockchain technology is transforming financial services from the traditional centralized approach (CeFi) towards the new financial services approach which is fully decentralized (DeFi). Unlike CeFi which works with a centralized entity in charge of validation and reconciliation of financial transactions, DeFi's financial services work on a peer-to-peer approach without any centralized controlling entity. Several crypto-investors see DeFi as the future and the new edge of financial services despite the risk of money laundering and terrorism financing, among some of the risks/treats associated with the use of cryptocurrencies.

Cryptocurrencies bring many benefits to financial services, particularly, security, efficiency, facilitation of cross-border transactions, and reduced transaction costs. Despite these benefits, these virtual currencies pose several risks and challenges, e.g. weak or no regulation, operational risk, cybersecurity risk, governance and integrity risks, AML/CFT risks, investor protection and data protection issues, and macro-financial instability. To mitigate these risks and challenges, almost all the advanced economies have introduced regulations to limit the trading of cryptocurrencies and crypto-assets in their jurisdiction, and have launched studies to issue their own CBDC.

Unlike advanced economies, Eastern African countries have not yet defined any rule and law to regulate the use and trading of cryptocurrencies and crypto-assets. These are implicitly banned in the region although there is an increasing share of the population in these countries who trade these currencies online. In addition, none of the countries in the region have yet started to think about launching their own CBDC to take advantage of blockchain technology and the benefits of cryptocurrencies built on this technology.

Blockchain technology and cryptocurrencies are transforming financial services providers and products offering. Eastern African countries should be part of the global movement created by cryptocurrencies and the underlying technology (the Distributed Ledger Technology or blockchain). In this regard, the recommendations listed below should help Eastern African countries to implement measures and action plans to benefit from cryptocurrencies and blockchain technology:

1. Each country in the region should define a legal and regulatory framework to manage the challenges and

risks posed by the usage of cryptocurrencies and crypto-assets.

2. Each country in the region should initiate research and study for the issuance of its digital currency (CBDC).

3. Regulators in the region should work toward implementing pan-regional harmonized personal data protection laws by reaching a consensus on the regulatory goals. For this to be efficient, the regional policymakers, with the support of their development partners, should decide about policy options at the intersection of data protection and blockchain technology according to the values and policy goals of individual countries and the regional community, not according to real or perceived technical constraints. Establish "data protection by design" provisions in data protection laws, which means that they should be a provision in the data protection laws to embed data privacy features and data enhancing technologies directly into the design of any project at an early stage.

4. The regional policymakers and private actors, with their development partners, should develop a pan-regional blockchain strategy to take advantage of this powerful cutting-edge technology.

5. The region needs to support high-level research and education on blockchain technology and its governance. The education levels on blockchain and other advanced technologies in Eastern African countries are low. Fostering skills, developing talent, and creating a stimulating innovation environment will help close the current gap the region has in the understanding and use of cryptocurrencies and crypto-assets.

6. The region needs to explore the feasibility of creating and operating a pan-regional blockchain infrastructure that offers a testbed for innovators, researchers, businesses, and the public sector to run blockchain-based applications.

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