CAN BLOCKCHAIN TECHNOLOGY REDUCE THE COST OF REMITTANCES?

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Abstract

The achievement of the Sustainable Development Goals (SDGs) demands unprecedented resources and efforts. Remittances as one of the largest development finance flows are an important source of income for millions of households in developing countries and offer tremendous potential to contribute towards the achievement of Agenda 2030. However, the high cost of sending remittances limits their full potential. The global average cost of sending USD 200 is 6.9% of the remittance. SDG 10 C aims to reduce the cost to less than 3% and to eliminate remittance corridors with cost higher than 5% by 2030. Blockchain technology promises to disintermediate banks, transform the financial landscape and drastically reduce the cost of cross-border transactions, yet there is a need for further evidence on this topic.

The OECD Development Co-operation Directorate (DCD) has developed this paper to provide an overview of diverse perspectives on the intersection of blockchain technology and remittances by exploring the opportunities and challenges of this technology for reducing the cost of remittances. The paper identifies several limitations, such as data privacy risks, regulatory uncertainty and last-mile delivery, among others, while investigating whether blockchain technology is the solution to reduce the cost of remittances.

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Abbreviations and acronyms

AML	Anti-money laundering
BEPAB	Blockchain Expert Policy Advisory Board
BIS	Bank for International Settlements
CBDC	Central Bank Digital Currency
DCD	Development Co-operation Directorate
DLT	Distributed Ledger Technology
ECB	European Central Bank
FATF	Financial Action Task Force
FSB	Financial Stability Board
GPI	Global Payment Initiative
GSMA	Global System for Mobile Communications Association
IFC	International Finance Corporation
IMF	International Monetary Fund
IOM	International Organisation for Migration
KYC	Know your customer
MNE	Multinational enterprise
ODA	Official development assistance
ODL	On-Demand Liquidity
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of United Nations High Commissioner for Human Rights
PoC	Proof of concept
SDG	Sustainable Development Goal
SWIFT	Society for Worldwide Interbank Financial Telecommunication
UNCDF	United Nations Capital Development Fund

Executive summary

Remittances are known to be an important source of income for millions of families in developing countries and are one of the largest sources of development finance. With a record USD 529 billion flowing to low and middle-income countries in 2018, remittances are three times higher than official development assistance (ODA) and have reached close to the level of foreign direct investment flows in 2018 (World Bank Group; KNOMAD, 2019[1]). Remittances increase disposable household income and are associated with household investments in education, health and entrepreneurship, all of which have a high social return in most circumstances. They can contribute to multiple Sustainable Development Goals (SDGs) across the household level, community level and the national level. If current trends of remittances continue, between 2015 and 2030, the timeframe of the 2030 Agenda, migrants will be transferring an estimated USD 8.5 trillion to their communities of origin in developing countries. Of that amount, more than USD 2 trillion – a quarter — will either be saved or invested, a key aspect of sustainable development (IFAD, 2019[2]).

Despite the welfare gains associated with remittances, the cost of sending them continues to limit the flow of funds hindering their potential for development. In 2018, the global average cost of sending USD 200 to low and middle-income countries was 6.9% of the remittance (World Bank Group; KNOMAD, 2019[1]). The high transfer cost reduces the amount received by the households and encourages the use of informal channels. The prevalence of informal channels hinders the contribution of remittances to the development of domestic financial markets limiting households' ability to use the formal financial system for their savings and investments. Recognising the importance of cost reduction, the G8 had adopted the "5*5" target to reduce the global average cost of sending international remittances from 10% to 5% between 2009 and 2014. It was in 2016 that the G20 aligned its work with the 2030 Agenda by including a new target on remittances under SDG 10. SDG 10.C, aims to reduce the cost to less than 3% and to eliminate remittance corridors with, cost higher than 5% by 2030.

The introduction of new payment interfaces and technological tools improved the domestic payment infrastructure resulting in an inexpensive and near instant domestic payment systems. However, cross-border payments remain expensive, opaque and slow, especially for retail payments such as remittances. The advent of mobile phones and innovative business models has made it possible to reduce the cost, but the cost remains above the SDG target of 3% in certain corridors. Bitcoin with its underlying distributed ledger technology aims to disintermediate banks and enable peer-to-peer transactions. Cryptocurrencies like Bitcoin were expected to affect remittances but they have suffered from limitations such as severe price volatility and became a new medium for illicit activities thereby failing to provide a stable means of payment. In the light of concerns against cryptocurrencies, a new type of asset called stablecoins aims to address the volatility issues and provide a stable means of payment. However, beyond cryptocurrencies and stablecoins, the underlying blockchain technology promises to transform the financial landscape and challenge traditional business models by addressing some of the typical shortcomings including access, speed, transparency and transaction cost.

Recognising the distinction between the technology and its applications (that include cryptocurrencies and stablecoins), this paper outlines different ways in which blockchain technology provides opportunities to

facilitate remittances. The use of cryptocurrencies and stablecoins built on blockchain technology is one way that can potentially help in cost reduction. The development of new stablecoin initiatives like Libra by a group of currently 20 multinational enterprises (MNEs) including Facebook, Uber and Spotify, among others and Central Bank Digital Currencies (CBDCs) underlines the importance of stablecoins for payments and settlement. Another way is the use of blockchain technology for facilitating know your customer (KYC) procedures, efficient clearing and settlement[1].

As there is no clear evidence to substantiate the promises of blockchain technology, this paper aims to fill the research gap by further exploring the question "Can blockchain technology reduce the cost of remittances?" and providing an overview to develop a nuanced understanding. The OECD conducted 25 interviews with a range of international experts on blockchain technology and remittances from both public and private sectors to illustrate diverse perspectives[2]. Within the context of remittances, the conducted interviews pointed out the following four ways in which blockchain technology is used: (i) Use of cryptocurrencies or stablecoins for transactions (ii) Use of cryptocurrencies or stablecoins as an intermediary currency or a bridge asset (iii) Use of blockchain technology for know your customer requirements (iv) Use of blockchain technology for instant settlement and correspondent banking

Despite recognising the potential of blockchain technology for remittances, this paper outlines several limitations. The mere use of blockchain technology is unlikely to solve the problem of last-mile delivery in cash. The extent of financial exclusion particularly in rural areas is likely to be a barrier for cutting down the intermediaries. The potential use of digital identities for KYC facilitation raises questions about possibilities of data misuse thereby deepening the existing political asymmetries. While it is important to recognise the opportunities of stablecoins for remittances, there is also a need to look at some of the risks posed by stablecoins. The report of the G7 Working Group on Stablecoins states that *"*stablecoins regardless of size, pose challenges and risks to anti-money laundering /terrorist financing efforts across jurisdictions, as well as operational resilience (including for cyber security), consumer/investor and data protection, and tax compliance. Global stablecoins, by nature of their potential scale, may amplify those challenges and could also pose challenges to competition policy, financial stability, and monetary policy and, in the extreme, the international monetary system*"* (G7 Working Group on Stablecoins, 2019[3]). Any public or private sector initiative on stablecoins must be able to address the risks to be operational. In addition to the risks of stablecoins, the challenges associated with the scalability, interoperability and maturity of technology limits the wide-scale adoption of blockchain technology for clearing and settlement.

The technology is still young and immature. The existing pilot projects and small-scale projects highlighted the need to further experiment in conjunction with regulators and policy makers. Policy makers need to act as catalysts in shaping a favourable ecosystem for the deployment of blockchain technology by advocating pilots, innovation hubs and sandboxes, for setting regulatory standards that can be applied at global scale.

[1] Please note, the authors refer to blockchain technology, inclusive of its applications (cryptocurrencies or stablecoins), unless a clear distinction is made in the paper.

[2] The phone interviews were conducted for about 30 minutes to one hour. Please find a list of all contributors to the paper in the acknowledgements section, noting that some contributors preferred not to be mentioned in the paper.

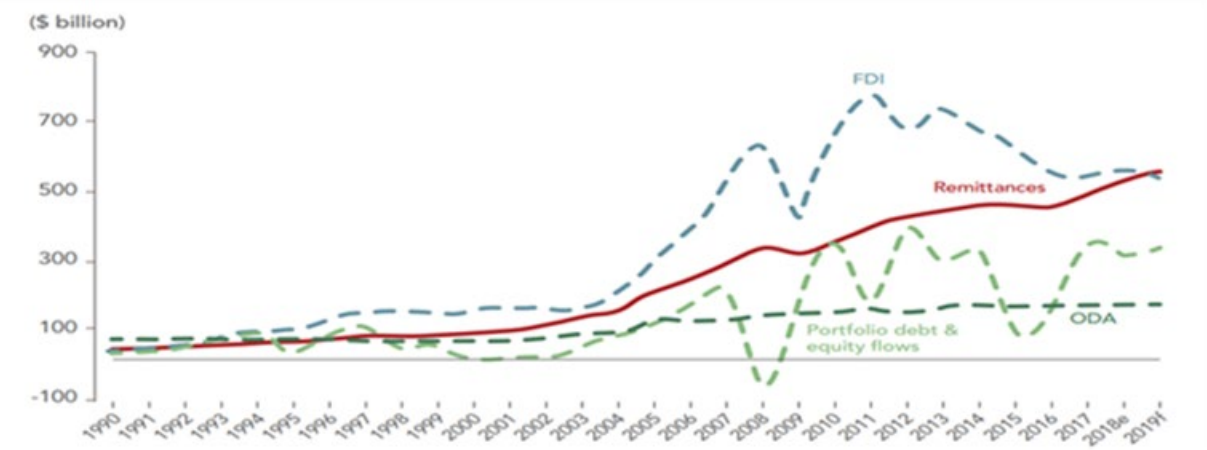
1. Remittances and their potential for sustainable development

Remittances are financial or in-kind transfers made by migrants to friends and relatives back in their countries of origin. The statistical definition of international remittances only partially reflects this understanding. According to the International Monetary Fund (IMF), remittances consist of compensations of employees (including migrant workers, country residents working for embassies, international organisations or foreign companies) and personal cash or in-kind transfers made or received by residents of one country to individuals in another country regardless of them being migrants (IMF, 2009[4]). This definition comprises what is known as internal or intra-border remittances (IMF, International Monetary Fund, 2009[5]). The International Organisation for Migration (IOM) broadly defines migrant remittances as personal money transfers from migrant workers[3] to their relatives in their country of origin. Both these definitions preclude any form of financial investments such as portfolio investments, real estate investments and small enterprises located in countries of origin and sometimes managed by relatives. (Ratha and Plaza, 2017[6]). This paper solely focuses on remittances as personal, non-investment transfers from non-residents to residents of a country such as a worker abroad sending money to family and friends.

Remittances are a significant benefit to countries, particularly low and middle-income countries and are considered a relatively stable source of foreign exchange. In 2018, remittances flows to low and middle-income countries grew by 9.6% to reach a record USD 529 billion and are likely to reach USD 550 billion in 2019 (World Bank Group; KNOMAD, 2019[1]). They are three times more than the volume of official development assistance, which reached USD 153 billion in 2018, a fall of 2.7% compared to 2017 (OECD, 2019[7]). They have also reached close to the level of foreign direct investment flows to developing countries in 2018 (see Figure 1.1). Excluding People's Republic of China (hereafter 'China'), remittances to low and middle-income countries were even larger than the FDI flows in 2018. They are also considered more stable with a steady increase (World Bank Group; KNOMAD, 2019[1]).

[3] A migrant worker refers "to a person who is to be engaged, is engaged or has been engaged in a remunerated activity in a State of which he or she is not a national". They are sometimes referred to as "foreign workers" or (temporary) contractual workers" (Office of United Nations High Commissioner for Human Rights, OHCHR, 1990[81]).

Figure 1.1. Remittances flow to low and middle-income countries, ODA and private capital flows, 1990-2018



Source: (World Bank Group; KNOMAD, 2019[1]) Migration and remittances: recent developments and outlook. https://www.knomad.org/sites/default/files/2019-08/World%20Bank%20Board%20Briefing%20Paper-LEVERAGING%20ECONOMIC%20MIGRATION%20FOR%20DEVELOPMENT_0.pdf

Remittances to South Asia increased by 12.3% to reach USD 131 billion in 2018 and by 9.6% to sub-Saharan Africa reaching USD 46 billion. Similarly, in 2018, the growth rate of remittances flows to Middle East and North Africa was 9.1% reaching USD 62 billion. The remittances flows to East Asia and Pacific was USD 143 billion. In terms of top recipient countries, India (USD 78.6 billion), China (USD 67.4 billion), Mexico (USD 35.7 billion), the Philippines (USD 33.8 billion) and Egypt (USD 28.9 billion) are the top five recipients respectively (World Bank Group; KNOMAD, 2019[1]).

Given such enormous flows, remittances promote growth in less financially developed countries by providing an alternative way to finance investment and acting as substitute for inefficient or inexistent credit markets (Giuliano and Ruiz-Arranz, 2009[8]). In a favourable policy environment, they can remove credit constraints and allow households to invest in businesses and other productive activities (OECD, 2017[9]). Remittances increase disposable income for households and have potential multiplier effects. Apart from being an important income source for the households, remittances spent on consumption may also contribute to development and growth by increasing the demand for goods and services, while stimulating production and employment (Durand, Parrado and Massey, 1996[10]).

Remittances increasingly play a decisive role when crises hit (economic, natural or political), with migrant workers increasing the volume of their remittances to buffer the crises. In 2018, for instance, remittances to India grew by over 14% as a likely consequence of a flooding disaster in the southern Indian state of Kerala, to which migrants responded by sending financial help to families back home (World Bank Group; KNOMAD, 2019[1]). When political instability struck Egypt during the Arab Spring, investors and donors withdrew, but remittances inflows to Egypt increased between 2009 and 2011 (WorldBank, 2013[11]). Past records show that remittances rose during financial crisis in Mexico in 1995 and in Indonesia and Thailand in 1998 (Ratha, 2007[12]).

Remittances act as a strong anti-poverty measure. It has been found that 10% increase in international remittances from each migrant will lead to a decrease, on average, of 3.5% in the share of people in poverty (Page and Adams, 2003[13]). Another study analysing remittance flows for a sample of 33 African countries

for the period 1990-2005, found that the depth and severity of poverty were declining (Anyanwu and Erhijakpor, 2010[14]). The studies demonstrate that remittances increase household income and reduce the severity of poverty. Thus, remittances can significantly contribute towards reaching SDG 1: No Poverty, SDG 2: Zero Hunger and SDG 6: Clean Water and Sanitation.

Although remittances are often spent on consumption goods, research has shown that remittances are also associated with increased household investments in education, health and entrepreneurship: all of which potentially have a high social return (Ratha, 2007[12]). Numerous household surveys reveal that on average, remittance-receiving households make higher investments in health care and education than those households that do not receive this type of income. The presence of remittance income tends to correlate with positive health outcomes, especially for children. For example, infants in remittance receiving households in Mexico and Sri Lanka have been found to have higher birth weights. Remittance receiving households also have lower rates of infant mortality and children with higher weight levels during early childhood, as well as higher health-related knowledge than similar households that do not receive remittances (Hildebrandt and McKenzie, 2005[15]; United Nations Development Programme, 2009[16]; Prabal and Ratha, 2012[17]). Remittances are associated with higher spending on education in Senegal (Ndiaye et al., 2016[18]), higher school enrolment in the Philippines (Theoharides, 2018[19]) and more years of completed schooling in rural Morocco (Bouoiyour and Mitfah, 2015[20]). Hence, remittances could help in advancing towards SDG 3: Good Health and Well-Being and SDG 4: Quality Education.

The reviewed evidence suggests that remittances contribute to the SDGs in many ways across the national level, community level and household level. If current trends continue, between 2015 and 2030, the timeframe of the 2030 Agenda, an estimated USD 8.5 trillion will be transferred by migrants to their communities of origin in developing countries. Of that amount, more than USD 2 trillion – a quarter — will either be saved or invested, a key aspect of sustainable development (IFAD, 2019[2]).

Despite the potential of remittances in accelerating the development agenda, often, the inefficiencies of the existing cross-border payment system resulting in high cost limits their benefits. In 2018, the global average cost of sending USD 200 to low and middle-income countries was 6.9% of the remittance (World Bank Group; KNOMAD, 2019[1]). The cost of sending USD 200 to Africa is particularly high at 9.3% (World Bank Group; KNOMAD, 2019[1]). In general, South-South remittances cost are very high at 18.7% on average within sub-Saharan Africa in 2018, almost three times higher than the global average (World Bank Group; KNOMAD, 2019[1]). This high cost minimises the overall benefits to the population, particularly to poor households of recipient countries. The high remittance cost reduces the amount received by the households and encourages the use of informal channels. The prevalence of informal channels hinders the contribution of remittances to the development of domestic financial markets limiting the households' ability to use the formal financial system for their savings and investments (OECD, 2017[9]). The cost reduction would increase the disposable income of poor migrants and their incentives to send money back home through formal channels. Remittances are likely to increase as the cost goes down and there will be a further shift towards the formal channels (Gibson, McKenzie and Rohorua, 2006[21]; Freund and Spatafora, 2008[22]).

The significance of cost reduction has rightly caught the eye of policy makers with the G8 and the G20 committing to facilitate the flow of remittances and reduce the global average cost of remittances. The G8 adopted the "5*5" target to reduce the global average cost of sending international remittances from 10% to 5% between 2009 and 2014. It was in 2016 that the G20 aligned its work with 2030 Agenda by including a new target on remittances under SDG 10. SDG 10.C, aims to reduce the cost to less than 3% and to eliminate remittance corridors with, cost higher than 5% by 2030.

However, the current global average still remains 4% higher than the target envisioned under SDG 10.C. It is necessary to tap the potential of remittances and work more towards improving the financial payments system at a rapid pace. The following section briefly outlines the reasons for high cost of remittances and the efforts so far addressing the problem.

1.1. What explains the high cost of remittances?

Multiple factors, often interwoven, determine the transaction cost associated with remittances. These include, but are not limited to (Beck and Peria, 2009[23]; Ratha, 2006[24]):

- **Cash-based transactions:** The prevalence of cash-based transactions necessitating first-mile and last-mile[4] delivery drastically affects the cost dynamics. The substantial use of remittances for consumption rather than savings or investment has driven the popularity of basic cash to cash services, as opposed to other payment forms such as cash-to-account (Suki, 2007[25]). Typically, at least one leg of a transfer journey involves physical cash either at the origin, when a migrant worker hands over cash to a money transfer operator or at the destination when cash is handed out to the families, who lack bank accounts. This results in opening up cash distribution access points by money transfer operators, of which, the cost of operation are passed on to the customers. The cost of operating distribution points comes in the form of commissions to local agents or as salaries and rents, depending on the business model.
- **State of cross-border payments system:** The underdeveloped state of cross-border payments mechanisms with inefficiencies and complex arrangements raises the cost of remittances. Often, a typical remittance involves multiple intermediaries and, more so, when the financial infrastructure of the receiving countries is weak. The involvement of several access points and processes leads to increase in the cost for service providers who then tend to pass this cost to the end customers. The infrastructure needed to support remittance services is sometimes inadequate and the use of correspondent banking can be expensive for small value payments of USD 200 or below. Therefore, it is crucial to improve the payments system infrastructure that has the potential to increase the efficiency of remittance services (WorldBank; Bank for International Settlements, 2007[26]).
- **Regulatory and compliance cost:** The regulatory and compliance procedures that include KYC requirements to curb money laundering and terror financing have raised the cost of operations for money transfer operators. A survey conducted by Thomson Reuters in 2016, revealed that financial firms' average cost to meet KYC obligations are USD 60 million, some are spending up to USD 500 million on compliance with KYC and customer due diligence (Thomson Reuters, 2016[27]). The increased regulatory standards resulted in many banks closing their correspondent banking relationships with money transfer operators, an increasing phenomenon known as de-risking. In addition, there are regulatory costs associated with registration and licensing of the company in order to deter fraudulent practices and protect consumer interests. The lack of uniformity regarding the registration requirements among the countries tends to increase cost and discourages the entry of smaller players distorting competition.
- **Lack of competition:** Remittance fees tend to be higher in which bank concentration is high and competition low (Ratha, 2006[24]). The level of competition can be dependent on remittance volume and sometimes-exclusive arrangements of largest money transfer operators. High volume corridors tend to attract more competition resulting in lower fees. Exclusive arrangements with extensive distribution networks (like post-offices) by large money transfer operators like Western Union and Money Gram can block or bar entry by small competitors (Ratha, 2006[24]). It helps in reducing the competition and allows money transfer operators to maintain a high price premium.

[4] In this paper, the authors consider the sending side to be the first mile and the receiving side as the last-mile.

1.2. New business models for cost reduction

The advancements in the use of technology by money transfer operators and emergence of new non-blockchain fintech business models (like TransferWise, WorldRemit and Remitly, among others) for remittance services have significantly improved the efficiency of operations resulting in cost reduction. The proliferation of mobile phones has led to a rise in the use of mobile money[5] for international remittances with new models offering remittance services at a cheaper rate. A study by Global System for Mobile Communications Association (GSMA) in 45 country corridors found that the average cost of sending USD 200 using mobile money was 2.7%, compared to 6% using global money transfer operators in 2016. Using mobile money, is on average, more than 50% cheaper than using global money transfer operators and 21% cheaper when mobile money cash-out fees are considered (GSMA, 2016[28]). Mobile money is particularly competitive for low-value transactions (GSMA, 2016[28]). The total value of mobile-money enabled international remittances processed in 2018 was USD 4.3 billion. According to the GSMA 2018 report, the average cost of sending USD 200 via mobile money is 1.7% (GSMA, 2018[29]). The increasing penetration of mobile phones has facilitated a new wave of services and utilities being offered. Nowadays, mobile money, which allows digital storage of funds, is increasingly used for a variety of goods and services. For example, digital payments can be used to buy goods from a local merchant in United Republic of Tanzania (Lipa Kwa M-Pesa) and to pay school fees in Côte d'Ivoire (Orange money), to pay utility bills in El Salvador (Tigo Money) and to buy government bonds in Kenya (M-Akiba) (Scharwatt and Sanin, 2017[30]). The increasing extent of digital payments ecosystem could reduce the need for cashing-out and result in cheaper remittances using mobile money.

Though mobile money promises to reduce the cost, the digital payments ecosystem is unevenly distributed and is yet to percolate in many parts of the world. In 90 countries, there are 272 live mobile money deployments. Out of 272 mobile money deployments, 45.6% of them are in sub-Saharan Africa, 33.2% in South Asia and 11% in East Asia and Pacific (GSMA, 2018[29]). There are 866 million registered mobile money accounts of which only 298.7 million are active 90-days accounts. Cash-in and cash-out transactions still represent the majority of mobile money flows in 2018 (GSMA, 2018[29]). According to the conclusions of the world cash report 2018, cash remains the most widely used payment instrument in the world and on all continents, in particular Asia and Africa are still cash-based (G4S Cash Solutions; Payments Advisory Group, 2018[31]). As remittances are largely used for consumption purposes in developing countries, residing in heavily cash-based society would then mean cashing out the remittances received. The majority of mobile money still remains cash-based at the end and comes with an increase in the number of active disbursement agents. The number of disbursement agents globally increased from 538 000 in December 2012 to nearly 2.9 million in December 2017 (GSMA, 2018[32]). In addition, to cash transactions, the lack of financial literacy, technological literacy and familiarity with digital options for the migrant workers and their families who come from lower-income and less-educated sections hinders the potential of mobile money. Despite the rise of new business models and modes of payment, the global average cost remains around 4% higher than the SDG target.

In the wake of such potential impact of technological revolution on the cost of remittances, blockchain technology with its distributed, immutable and peer-to peer mechanisms is increasingly being perceived as a game changer for the remittances market. Cryptocurrencies, the initial application of blockchain technology attempts to overhaul the traditional cash transfer system and cut down the intermediaries enabling peer-to peer mechanism. The use of blockchain technology promises to instantly settle transactions and cut down the capital costs associated with the current settlement system. The technology promises to address some of the shortcomings of the traditional payment systems such as speed, access, transparency and transaction cost. The following sections will focus on the opportunities and challenges of using blockchain technology for remittances.

[5] Mobile money can be defined as a "service in which the mobile phone is used to access financial services" (GSMA, 2010[78]).

2. Opportunities for using blockchain technology for remittances

Distributed Ledger Technology(DLT) is a way of recording data across multiple ledgers, which are maintained and controlled by a distributed network of computer servers called nodes (Houben and Snyers, 2018[33]). The cryptographically secure, append-only, tamper-resistant peer-to-peer decentralised networks are updateable only through distributed consensus (Warren, Wolff and Hewett, 2019[34]). Blockchain technology is a particular type of distributed ledger technology. It is a decentralised (distributed) electronic ledger system that records any transaction of value whether it is money, goods, property, work or votes (Plansky, O'Donnell and Richards, 2016[35]). It is a shared ledger of transactions not controlled by a single authority (OECD, 2018[36]). Blockchain may be an open, publicly accessible database or access may be restricted to a specified group of users. Public blockchains (like Bitcoin) are open for anyone to read and view, while only a chosen group of people can view private blockchains.

The use of blockchain technology promises a conceptually novel approach of sending and receiving remittances that includes new digital forms of money, novel payment infrastructure and new types of remittance service providers. The technology and the other applications built on it (that includes cryptocurrencies and stablecoins) offer opportunities in multiple ways for reducing the cost of cross-border payments. In 2008, Bitcoin emerged as the first application of blockchain technology. As a peer-to-peer version of electronic cash, Bitcoin attempted to transfer online payments without having to go through a financial institution (Nakamoto, 2008[37]). Post Bitcoin, cryptocurrencies[6] were considered as one of the potential ways in which the technology could disrupt the traditional way of money transfer and reduce the cost. However, cryptocurrencies failed to provide a reliable means of payment. They have suffered from highly volatile prices, scalability, governance and regulatory issues among others. In view of the high price volatility of cryptocurrencies, stablecoins[7] have come to the fore as the new type of asset that aspires to address their volatility concerns and offer a reliable means of payment.

Beyond the potential of cryptocurrencies and stablecoins, the underlying blockchain technology with its distributed and immutable characteristics offers new ways of making cross-border payment systems, particularly, remittances more efficient. Recognising the distinction between blockchain technology and its applications that include cryptocurrencies and stablecoins, this section aims to outline the possible major use-cases of blockchain technology for remittances.

[6] The Financial Action Task Force ("FATF") has approached "cryptocurrencies as a subset of virtual currencies, which it defines as digital representations of value that can be digitally traded and function as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but do not have legal tender status (i.e., when tendered to a creditor, are a valid and legal offer of payment) in any jurisdiction" (Financial Action Task Force (FATF), 2014[79]).

[7] Stablecoins can be defined as "digital units of value that are not a form of any specific currency (or basket thereof) but rely on a set of stabilisation tools which are supposed to minimise fluctuations of their price in such currency(ies)" (Bullmann, Klemm and Pinna, 2019[43]).

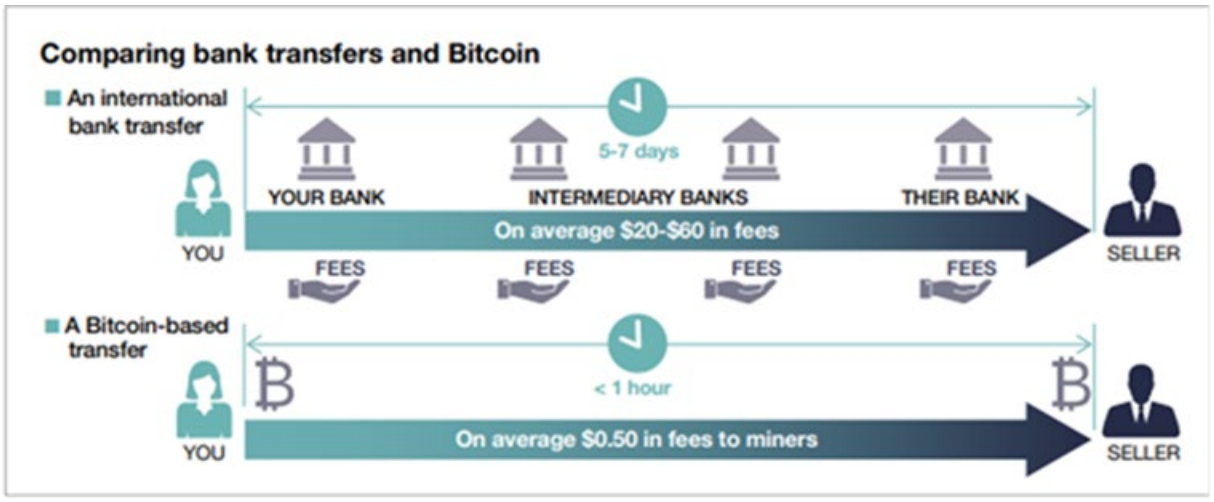
The interviews indicated the following major ways in which cryptocurrencies and blockchain technology is used:

- Use of cryptocurrencies or stablecoins for transactions
- Use of cryptocurrencies or stablecoins as an intermediary currency or a bridge asset
- Use of blockchain technology for KYC requirements
- Use of blockchain technology for instant settlement and correspondent banking

2.1. Use of cryptocurrencies or stablecoins for transactions

The first wave of cryptocurrencies especially Bitcoin built on the underlying blockchain technology emerged as a means to make person-to-person transactions. As a peer-to-peer currency, Bitcoin enables users to transfer value to one another without having to go through a bank and eliminates the intermediaries involved in the process (see Figure 2.1). The characteristics of Bitcoin enabling direct cross-border transactions is considered a novel way to transfer remittances and address the shortcomings of the existing payment systems including speed and cost. The potential of cryptocurrencies has attracted people towards cryptocurrencies in politically unstable or economically weaker countries like Bolivarian Republic of Venezuela (hereafter 'Venezuela'). The case of Venezuela (see Box 2.1) demonstrates how cryptocurrency is used for peer-to peer transactions.

Figure 2.1. Comparing bank transfers and Bitcoin



Source: (OECD, 2018[38]) OECD blockchain primer. https://www.oecd.org/finance/OECD-Blockchain-Primer.pdf

Box 2.1. Use of cryptocurrency in Venezuela

The scarcity of cash, sluggish transactions, hyperinflation and the debilitating economy has deteriorated payment systems and attracted people towards cryptocurrencies in countries like Venezuela. As a result, there is a growing number of people using Bitcoins and merchants accepting cryptocurrencies as payments. "The local market for Bitcoins broke a record in April 2018, reaching USD 1 million worth on that day alone", Bloomberg reported (Patriciya, 2018[39]). Venezuela has been ranking second worldwide in volume of activity on LocalBitcoins.com, the exchange that most Venezuelans use (Rendon, 2018[40]). According to Coin Dance, a website that monitors cryptocurrency transactions, in February 2019, people in Venezuela traded about USD 6.9 million on LocalBitcoins.com (Hernández, 2019[41]). Cryptocurrency is also opening virtual humanitarian aid corridors, which have not previously existed in Venezuela or anywhere else. Initiatives such as EatBCH and Bitcoin Venezuela are receiving cryptocurrency donations, which are then used to buy and distribute food on the streets of Venezuela (Rendon, 2018[40]). The same Bitcoin is also being used to receive remittances in Venezuela at a cheaper price than traditional transfers do. Bitcoin became a cheaper and faster way for Venezuelans residing abroad to send money back home (Hernández, 2019[41]).

The case of Venezuela illustrates that in a particular national context, Bitcoin offered an alternative way of remittances transfer when compared to the national currency but Venezuela is an exception. Often, cryptocurrencies are criticised for their high volatility, partially unregulated nature, absence of a formal governance structure and risks associated with regard to money laundering/terror financing and consumer protection (Chimienti, Kochanska and Pinna, 2019[42]). However, in the case of Venezuela, these concerns did not hinder the use of cryptocurrencies, particularly, Bitcoin. The volatility of Bitcoin was not a big concern in Venezuela as the local currency, Bolivar, was more volatile than Bitcoin. This is not the same case with the rest of the world currencies. The launch of state backed cryptocurrency Petro in Venezuela though was unsuccessful, yet, legalised the use of other cryptocurrencies thereby making it easier for people to use them as a common mode of exchange at the national level. Whereas the legality of cryptocurrencies is not uniform across the world. Thus, the context and the political situation needs to be taken into consideration before drawing any conclusions about the potential of cryptocurrencies for remittances.

The use of cryptocurrencies especially Bitcoin have not yet succeeded to provide a stable and reliable means of payment or store of value, thereby hindering the adoption of this mechanism for peer-to-peer cross-border payments on a global scale. In light of the high volatility concerns, stablecoins aspire to address these concerns. The volatility of stablecoins is lower than that of most cryptocurrencies (Bullmann, Klemm and Pinna, 2019[43]). More recently, financial service providers and technology companies have been working towards the development of stablecoins on a global scale. The announcement of Libra by an association of currently 20 multinational enterprises[8] (MNEs) including Facebook, Uber and Spotify is one such development that aims to improve financial access and provide faster, efficient retail payments across borders. With the already existing larger customer base of the companies' part of Libra Association, it could scale rapidly and target a wider audience.

Owing to regulatory constraints, Libra might become operational in a different form to that of its current form. Nonetheless, the recent stablecoin initiatives have highlighted shortcomings in the cross-border payment systems. Some of them include issues of interoperability for payment service providers across jurisdictions, challenges in clearing and settlement, risks and cost associated with settling currencies and reliance on correspondent banking (CPMI, 2018[44]). Depending on their design, stablecoins may alleviate some of the complexities in the cross-border space and potentially improve the efficiency of cross-border

[8] Noting that some companies have dropped out from the Libra Association.

payments (G7 Working Group on Stablecoins, 2019[3]). The discussions at the OECD Global Blockchain Policy Forum 2019 and the conducted interviews pointed out that stablecoins space is evolving and will continue to develop. The stablecoins within an appropriate regulatory framework can create opportunities and may enable the reduction of cost (OECD, 2019[45]).

2.2. Use of cryptocurrencies or stablecoins as an intermediary currency or a bridge asset

The conducted expert interviews collectively pointed out that the use of cryptocurrencies or stablecoins as a bridge asset for clearing and settlement could be useful to cut down the cost of remittances. Instead of sending cryptocurrency directly to the recipient, a migrant worker sending money from the United States to the Philippines can use a service that converts dollars to a cryptocurrency and then the cryptocurrency is converted to the Philippine's Peso's at the recipient's end. Essentially, cryptocurrency is used in the back-end for facilitating remittances (Buenaventura, 2017[46]). A few business models that use cryptocurrencies as bridge assets in the back-end for transfers have reduced the cost of sending remittances in certain corridors. Some of the notable examples of such business models include BitPesa, Rebit.Ph, Bloom Solutions, Ripple (to name a few) all of which promise to disintermediate correspondent banks from the settlement process and reduce costs.

In the models where a cryptocurrency is the bridge asset, the transaction involves fewer steps with minimal or no need for correspondent banks in comparison to the typical remittance transfer. There is a first mile service (online or offline) where the remittance is deposited and there is a last-mile outlet receiving the client details and forwarding the payment to the recipient. Bitcoin or any other cryptocurrency is used in the middle process but the problem might lie with the last-mile partner as they might not have enough liquidity to convert incoming Bitcoins as remittances to local currency (Buenaventura, 2017[46]). The success of cryptocurrency cross-border remittance services depends on collaborating with the widespread last-mile network to provide cash-out services. BitPesa, for instance, uses Bitcoin as an intermediary currency as opposed to the US dollars and thereby avoids storing enormous cash reserves in the destination countries for instant settlement. It employs a transaction fee of about 2-4% in the African corridors and it does so by avoiding traditional intermediaries and other currencies as the intermediary currency. The integration with mobile money platforms has made it possible to provide last-mile-delivery without operating brick-and mortar branches for cash disbursement. However, BitPesa faces certain challenges particularly regulatory ones and is yet to make a significant impact.

The volatility of Bitcoin could pose additional risk to the companies says Filipino start-up, Bloom Solutions. During high volatility times of Bitcoin, even ten minutes (time taken for settlement) could turn out to be very risky. The rise of stablecoins and central bank digital currencies could become an alternative bridge asset for clearing and settlement. The emerged models are yet to scale in order to gauge the effectiveness of this technology objectively.

2.3. Use of blockchain technology for know your customer (KYC) requirements

The KYC verification process is one of the significant cost drivers for cross-border transactions. The institutions offering financial services are obliged by the regulators to verify their customers before on-boarding them to mitigate the risks associated with money-laundering and terror financing. Usually, the customer sends or shows the required documents (identity documents) to the financial services provider to facilitate the KYC verification process. The financial services provider analyses these documents and generates an additional, internal document that serves as the certification that assures the regulators that the KYC process has been properly conducted (Mayano and Ross, 2017[47]). The process is costly for financial service providers including heavy penalties if not conducted in accordance with the existing

financial action task force (FATF) regulations. These tougher banking regulations mandates financial institutions to assess the risks of doing business with weak anti-money laundering regimes. As a result, to reduce their own risks, financial institutions engage in de-risking which affects the remittances market. Due to this phenomenon of de-risking, there is a withdrawal of correspondent banking relationships and banks deny services to some money transfer operators, with, smaller service providers closing their businesses. According to a World Bank report on the G20 survey on de-risking activities in the remittance market, the countries where the phenomenon seems to be present (although in varying degrees of relevance) include Australia, Canada, Germany, France, Italy, Mexico, the United Kingdom, and the United States of America. The number of accounts being closed for money transfer operators in these countries appears to be increasing (World Bank Group, 2015[48]). The problems in accessing bank accounts for money transfer operators in G20 sending countries will eventually affect a large number of non-G20 receiving countries (World Bank Group, 2015[48]). In this context, blockchain technology may be a potential solution to address some of the KYC problems.

For on-boarding or an account opening, blockchain-based technology enables customers to use a digital fingerprint, which, like an actual fingerprint, can be used as a unique identifier. It can be stored on a distributed ledger and referenced by any bank in the network. The owner of the digital fingerprint can use it to submit new account applications and prove her or his identity universally (Ramachandran and Rehermann, 2019[49]). The use of decentralised blockchain structure could help to eliminate the overlapping KYC and anti-money laundering compliance checks (banks share authenticating information), and allows banks to disseminate data as it is updated (Higginson, Hilal and Yugac, 2019[50]). It could allow for efficiency gains, cost reduction, improved customer experience, and enhanced transparency throughout the process of on-boarding a customer (Mayano and Ross, 2017[47]).

With the help of this technology, the core KYC verification process would be conducted only once for each customer and can potentially be shared with all the financial institutions that they intend to work with. The use of digital identities might assist in one of the parts of KYC verification i.e. identification of customers. Blockchain can be used for the management of digital identities and has a great potential for banking. The KYC information linked to the digital identity of the customer is shared through the system. The amount of information stored and shared can be regulated through customer's settings, which also defines with whom what information is shared (Baars, 2016[51]). In addition, the use of other technologies like artificial intelligence and big data could help in picking up suspicious activities. Companies like Deloitte are working with clients and start-ups to develop solutions including smart identity, which can support banks' regulatory client on-boarding and the KYC processes. A verification experiment conducted by Deloitte testing the construction of an advanced KYC platform using blockchain technology confirmed that blockchain technology is applicable to KYC. However, it was also recognised that various issues, such as user demand, convenience and legal points of contention, need to be solved for practical implementation (Blockchain Study Group, 2018[52]).

R3, an enterprise blockchain software firm and ten of its member banks developed a proof-of-concept (PoC) for a KYC registry that addresses the challenges associated with satisfying KYC requirements and allows identities to be managed by their owners (Andreasyan, 2016[53]). Nearly 40 firms including BNP Paribas, China Merchants Bank and Deutsche Bank have carried out a global trial of a KYC application built on R3's Corda blockchain platform (Finextra (website), 2018[54]). There are multiple research papers, pilot tests and proof-of concepts highlighting the ways in which the technology might be used for the KYC process but so far, there has been no successful case study on a global scale involving cross-border transactions to carefully evaluate its application in the real world. (See section 3.5 for information on the risks associated with these processes).

2.4. Use of blockchain technology for settlement and correspondent banking

The cross-border payments system is complex with many intermediaries and correspondent banking that often increases the cost. Blockchain technology has the potential to streamline the underpinning clearing and settlement infrastructure, that is, correspondent banking. The correspondent banking relationships organised in 'nostro and vostro'[9] accounts are the backbone of cross-border payments-including remittances (Committee on Payments and Market Infrastructures, 2014[55]). For many financial institutions, correspondent banking accounts represent costly and inefficient 'idle capital'. According to a 2016 McKinsey & Company global payments report, there are approximately USD 5 trillion sitting dormant in these accounts around the world (McKinsey&Company, 2016[56]). The application of blockchain technology within existing correspondent banking arrangements aims to reduce the cost and fees, and to mobilise the idle liquidity locked-up in nostro and vostro accounts (Rella, 2019[57]). In 2017, the IMF outlined some of the potential cases of blockchain technologies in correspondent banking, focusing on risk management, cost reduction, and real-time settlement (International Monetary Fund, 2017[58]). The World Bank further summarised the potential of technology as that of "creating a distributed network for cross-currency funds settlement that replaces the correspondent banking network lowering settlement cost and increasing efficiency. Distributed ledger technology can also allow for new approaches to correspondent banking, which can potentially be part of a solution for addressing de-risking" (Natarajan, Krause and Gradstein, 2017[59]).

Ripple, IBM and Society for Worldwide Interbank Financial Telecommunication (SWIFT) are a few notable examples working on the use of blockchain technology for settlement purposes. The use case of Ripple provides an insight into the instant settlement system (see Box 2.2).

The IBM Blockchain World Wire initiative promises to clear and settle cross-border transactions in seconds. It plans to use a bridge token on the Stellar network to be able to clear and settle cross-border transactions. It has not launched any commercial transactions and is in the testing phase. The impact on cost reduction of this evolving space must be assessed at a more advanced stage.

The international remittance platform of Digiledge, a technology company based in India built on R3 Corda software helps banks and money exchange houses to improve the operational efficiency of international money transfer process by exploiting the properties of distributed ledger (Digiledge(website), 2019[60]).

[9] Nostro derived from Latin meaning "ours" refers to an account that a bank holds in a foreign currency in another bank. Vostro derived from Latin meaning "yours" refers to the accounts that other banks have on its books in its home currency (Kagan, 2019[80]).

Box 2.2. Use case: Ripple

Ripple, a technology company focuses on cross-border payments with the aim of replacing correspondent banking. The payment protocol of Ripple promises higher speed and lower fees by providing an interoperability layer between payment systems. The company has built a payment network called RippleNet, with a functionality called On-Demand Liquidity that unlocks the pools of liquidity trapped in nostro and vostro accounts with digital assets, specifically XRP, as a bridge currency between two fiat currencies. Ripple and other distributed technologies enable real-time bilateral payments – direct from sending to the receiving bank. This straight-through processing circumvents the chain of intermediaries that are required today, along with their cost, delays, and risks. Instead of settlement taking up to four days, Ripple promises settlement in three to six seconds (Ripple, 2016[61]). It signed on over two dozen customers for its On-Demand Liquidity (ODL) product, including MoneyGram, with the remittance giant using ODL for 10% of its payment flows from United States to Mexico (Motley Files Transcribers, 2019[62]). Ripple has not released transaction volume metrics, however, it is yet to make a scalable impact to convince the audience about the use of technology for cost reduction.

In addition, a protocol developed by Ripple promises to standardise messaging, clearing, settlement and tackle de-risking namely KYC/anti-money laundering (AML) compliance cost. It pledged to provide end-to-end transaction traceability and stronger visibility of fund transfers than SWIFT can deliver (Rella, 2019[57]).

SWIFT tested and tried its initiative 'Global Payment Initiative' (GPI) to improve the international payments. It published an interim report on the PoC for real time nostro reconciliation using SWIFT developed distributed ledger technology sandbox[10] with 33 global transaction banks. As per the report, the results show that the technology can support real time liquidity monitoring and reconciliation. The preliminary results from PoC are positive and promises to offer fast, transparent and traceable cross-border payments. However, the sandbox also identified issues that need to be addressed to achieve industry-wide adoption. Specific challenges listed include levels of sophistication, automation and past investment of banks. "It will take more time before it is mature and scalable enough for wide-scale applications" (SWIFT, 2017[63]).

Although the use of blockchain technology can produce multiple benefits by expediting, clearing and settlement to nearly real-time, reducing counterparty risks and freeing up collateral experimental, application of this technology has thus far produced mixed results. The hurdles in the development of the technology will need to be overcome for the application to arrive at the stage where it can provide better performance than systems currently in use (e.g. speed, computational cost, high-volume use and technical issues involved in distributed ledger technologies such as settlement finality) (OCED, 2020[64]).

[10] Sandbox refers to "a closed testing environment designed for experimenting safely with web or software projects". Regulatory sandbox is "a regulatory approach that allows live, time-bound testing of innovations under a regulator's oversight" (BBVA, 2017[76]). "Novel financial products, technologies, and business models can be tested under a set of rules, supervision requirements and appropriate safeguards" (United Nations Secretary General's Special Advocate for Inclusive Finance for Development, 2017[77]).

3. Challenges for using blockchain technology for remittances

This section outlines challenges that are likely to hinder the potential of blockchain technology for reducing the cost of remittances.

3.1. Last-mile delivery

One of the factors contributing to the high cost of remittances is the last-mile delivery problem. Cash remains the most widely used payment instrument in the world with Africa appearing to be the most reliant on cash. According to the World Cash Report 2018, there is an increasing growth in the value of ATM withdrawals indicating growing need for cash in day-to day transactions. There are only a small number of countries which show decreasing relevance of cash. These countries are mainly in the Oceania and Europe region (G4S Cash Solutions; Payments Advisory Group, 2018[31]). The idea of cashless society seems too far for the majority of countries across the world thus maintaining last-mile delivery in cash as the key component of remittances. The mere use of cryptocurrencies or stablecoins is unlikely to solve the problem of last-mile delivery in cash and hinders the potential of technology to cut down intermediaries and reduce significantly the transactions cost.

As remittances are primarily spent on consumption in developing countries, cryptocurrencies and stablecoins have to be converted to cash in order to be able to use the received remittance for consumption. Due to the demand for remittances in cash, some of the biggest money transfer operators like Western Union have a large network of agents operating in the remotest places of the globe delivering cash-based services to people where mobile money and other formal financial institutions have failed to deliver. Despite the use of cryptocurrency or stablecoin as a bridge asset, the demand for withdrawal in cash requires cash out locations or local exchanges. Thus, the last-miler must also ensure the liquidity of converting cryptocurrency or stablecoins to cash and not all the countries have the liquidity. There is not enough local demand and trust to absorb the cryptocurrencies, especially Bitcoin entering the markets (Buenaventura, 2017[46]). There is also cost involved in the conversion of cryptocurrency or stablecoin to cash.

Even in countries with the wide scale use of mobile money, there needs to be a wide network for cashing out cryptocurrency or stablecoin to mobile money. BitPesa for instance collaborated with M-Pesa, which is a mobile money service provider with heavy investment in last-mile infrastructure for wider outreach. BitPesa, however, could not continue the partnership with M-pesa due to regulatory constraints and seems to have resulted a shift in its focus from individual remitters to businesses as its main focus group. Thus, the success depends on the existence of robust money delivery infrastructure in the area, and effective partnerships with them.

3.2. Lack of financial inclusion

Globally, about 1.7 billion adults remain unbanked-without an account at a financial institution or through a mobile money provider. Virtually, the majority of these unbanked adults live in developing economies (World Bank Group, 2018[65]). Having a bank account makes it easier to receive remittances. The most commonly cited reason for not having an account is lack of enough money. Half of this unbanked population comes from poor households (World Bank Group, 2018[65]). The households receiving remittance are more likely to have access to bank accounts (OECD, 2017[9]). In comparison to unbanked households, households with access to bank account receive on average more remittances and less likely to receive remittances through informal channels (OECD, 2017[9]). Households in regions (particularly rural areas) with scarce financial coverage receive fewer remittances with a low frequency of remittance receipts (OECD, 2017[9]). Moreover, the multiplier effects of remittances can be harnessed through access to bank accounts. There is a positive association between access to bank accounts and savings (OECD, 2017[9]). However, offsetting the benefits of accessing bank accounts, both supply side and demand side barriers drive the financial exclusion. High cost, lack of financial infrastructure and strict requirements from supply side prevent households from accessing financial services. Lack of trust in financial institutions, low levels of financial literacy and language barriers among others from demand side leads to financial exclusion (Atkinson and Messy, 2012[66]). The financial exclusion and lack of access to financial services hinders the potential of blockchain technology to reduce the cost of remittances significantly. The lack of financial infrastructure (e.g. accessibility to financial institutions) and accounts or a mobile money provider makes it necessary for remittance service providers to have cash-based services, which increases the cost. Despite the use of cryptocurrencies or stablecoins as an intermediate currency, the lack of any account at the end-point of the transaction is likely to raise the number of intermediaries in the payment trail and minimises the potential cost reduction benefits associated with the use of technology.

3.3. Digital divide

The success of peer-to-peer cryptocurrency transactions or stablecoin transfer rests heavily on the accessibility to digital infrastructure (mobile connectivity, internet connectivity, email, access to electricity), technological literacy and familiarity with digital tools. Though there is an increasing concentration and adoption of mobile phones, mobile connectivity, however, is not equitable. According to the GSMA State of Mobile Internet Connectivity report 2019, just over 40% of low and middle-income countries population are connected to the internet, compared to almost 75% of the population in high-income countries. The mobile industry connects over 3.5 billion people to the internet (47% of the world population). More than half the world's population are therefore still unable to realise the social and economic benefits that mobile internet can enable. If the current trends continue, more than 40% of the population in low and middle-income countries will still be offline in 2025. Providing mobile internet access to the 4 billion people currently not connected will be more challenging as they tend to belong to the most marginalised groups and are disproportionately rural, female, illiterate and elderly population (GSMA, 2019[67]). In addition, the use and maintenance of mobile wallets for using cryptocurrencies or other digital currency requires basic technical knowledge. The process of buying, holding, sending and receiving cryptocurrency is likely to be challenging for non tech-savvy people especially small-scale migrant workers. Moreover cultivating trust among the recipients about the entire digitised ecosystem might be a challenge. The rapid advancements in the mobile and internet connectivity is leading towards non-cash transactions, which could pave a way for digitalised payment systems, potentially, reducing the dependence on cash. Blockchain technology may then take off this digital trend to achieve some of its promises.

3.4. Regulation

Regulation is crucial for tackling multiple risks for the protection of customers' interests, but it also hinders the adoption of blockchain technology for remittances. The case of using cryptocurrency for peer-to-peer transactions, especially Bitcoin, like the Venezuelan example raises concerns associated with the usage of cryptocurrencies for money laundering and terror financing. If the same model becomes global in nature, there are high chances of using cryptocurrencies for illicit activities. Keeping in mind the consumer interests and the potential impact of using cryptocurrencies for illicit activities, some countries like Nepal and Pakistan have banned the use of cryptocurrencies. However, the legality of cryptocurrencies is not uniform. Some countries allow the use of cryptocurrencies while some are ambiguous. In many developing countries, digital currency continues to be regarded with distrust. In particular, the legality of cryptocurrency is a concern and currently each country determines the extent to which blockchain can be used for transactions it its own context. What might work in one country might not work in another country. For example, what one country considers as an "e-wallet", another country within its own regulatory frameworks may consider "security". Overall, there seems to be a lack of regulatory uniformity associated with the use of cryptocurrencies, which affects the operations of companies.

BitPesa is one such example that faced regulatory constraints. Legal disputes had emerged between the company and legal authorities over the implications of Bitcoin to anti-money laundering/KYC regulations. In 2015, the Central Bank of Kenya issued a statement that the operations of the Bitcoin platform Bitpesa did not fall under the purview of the money transfer and remittance regulations of the Central Bank of Kenya, finding instead that Bitcoin was an unregulated currency. As mentioned earlier that BitPesa partnered with mobile money service providers, one such partnership was with Lipisha of Safaircom M-Pesa. In response to the central bank statement, Safaricom suspended its collaboration with an M-Pesa affiliated payments platform that was utilised by Bitpesa, arguing that its activities were not in compliance with Kenyan anti-money laundering laws (Rodima-Taylor and Grimes, 2019[68]). Due to the large-scale use of M-Pesa, the collaboration would have helped BitPesa to enable last-mile delivery and significantly reduce the cost but the regulation tried to hinder its operations paving for new collaborations with Airtel. Regulatory requirements in both origin and destination countries are important. If the governments in the countries are overtly negative towards cryptocurrencies then it is likely to affect the operations of companies exploring the use of blockchain technology for remittances. Anti-money laundering and counter terrorist financing compliance are critical to protecting the financial system from illicit finance and bad actors thereby adding significantly to the cost of cross-border payments.

Although, stablecoins offer new opportunities and payment methods, they are not immune from risks. The G7 Working Group on stablecoins highlights that "stablecoins if not effectively regulated can pose significant risks to financial integrity and may create new avenues for money laundering, terrorist financing and other illicit financing activities" (G7 Working Group on Stablecoins, 2019[3]). Stablecoins depending on the design and arrangement additionally present cyber and data privacy risks, tax compliance and consumer/investor protection challenges (G7 Working Group on Stablecoins, 2019[3]). Despite 24 operational stablecoins projects, the potential vast footprint of Libra seems to affect cross-border payments (Bullmann, Klemm and Pinna, 2019[43]). However, the scale of stablecoins can amplify the concerns associated with stablecoins and could potentially pose a threat to "financial stability, competition policy, monetary policy transmission and, in the extreme, the international monetary system" (G7 Working Group on Stablecoins, 2019[3]). Considering the legal, regulatory and oversight risks, any upcoming initiatives on global stablecoins must address them in order to be operational. The initiatives must adhere to regulatory standards and pass the regulatory scrutiny. The mere use of cryptocurrencies or stablecoins is unlikely to help companies bypass the regulatory requirements (and the resultant cost associated with it) of cross-border payment systems meant for a secure financial ecosystem. As innovation gathers pace, it is equally important for regulation to catch up and create an appropriate and approachable regulatory ecosystem. It is necessary to mitigate the significant risks associated with the use of technology while supporting the

public and private sector to innovate and experiment within an appropriate regulatory framework that paves a way for improving the traditional payments system.

3.5. Data privacy risks

The inefficiencies of the global cross-border payment systems have resulted in some actors to come up with initiatives that could potentially address them. The announcement of Libra has caught the attention of governments and regulatory bodies, including the United States Senate. The project is facing backlash from regulators and governments around the world. The promise of stablecoins for payments settlement seems to have sparked discussions among some central banks to explore government-controlled digital currencies. "The Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Sveriges Riksbank and the Swiss National Bank, together with the Bank for International Settlements (BIS), have created a group to share experience as they assess the potential cases for central bank digital currency in their home jurisdictions" (Bank of England, 2020[69]). The People's Bank of China has signalled interest towards the release of its own digital currency (Bloomberg news (website), 2019[70]). Countries like Venezuela and Islamic Republic of Iran are also looking towards the use of national cryptocurrencies to avoid sanctions. The Governor of the Bank of England in 2019 said that the dollar's position as the world's reserve currency must end, and that some form of global digital currency would be a better option (Swint, 2019[71]). There are projects around the world experimenting with central bank digital currencies like e-Krona of Sveriges Riksbank (Central bank of Sweden), and Project Ubin of Monetary Authority of Singapore, but so far there are no concrete results of central bank digital currency being used for cross-border retail payments. These calls and experiments of digital currencies by central banks raises several important questions about data privacy, sovereignty, ownership and security and the role of commercial banks considering that the liabilities usually sit with them. There is a possibility of data misuse by the private sector or the government, in particular, authoritarian regimes and countries lacking good governance. Especially, in countries with a weak/lack of rule of law there may be deliberate misuse of data by the powerful leading to rent extraction or political exclusion (Khan and Roy, 2019[72]).

The potential misuse of data and infringement of privacy rights by the involved parties both public and private are deeply perturbing. In light of the use of digital identities for KYC verification process, there is a possibility that their extensive use might further deepen political asymmetries, giving additional power to the powerful people (Khan and Roy, 2019[72]). Some of the most fundamental questions remain: who owns the data (who has access to it and who are the decision makers?) and how is it being controlled. These elements have to be well defined in the design of the application for stablecoins for a credible supervision of data so that any misuse is detected. Concerns about data security have come to the public eye and consumers are starting to ask more questions about who owns their information and most importantly, what they plan to do with it. The alarming data security risks if not addressed are likely to act as a barrier to the wide-scale launch and adoption of global stablecoin initiatives. Thus, it is becoming increasingly important for regulators around the world to mitigate data security and privacy risks without stifling innovation. Regulators are likely to keep the data protection standards in mind while evaluating their decisions of granting licenses to companies that are likely to use technologies affecting the privacy of individuals. It is also equally important and challenging to educate the public about the benefits and risks associated with the potential use of technology and related implications.

4. Conclusions

Remittances are an important source of income for millions of people in developing countries and can contribute significantly towards the achievement of SDGs. The high cost hinders the potential of remittances and encourages the use of informal channels, limiting the households' ability to use the formal financial system for their savings and investments. The advent of mobile phones and new business models resulted in cost improvements among certain corridors but not all. With the coming of cryptocurrencies and the potential of underlying blockchain technology to enable peer-to peer transactions and disintermediate banks, some companies have started to explore cryptocurrencies for remittances. The failure of cryptocurrencies to provide a reliable and stable means of payment has produced poor results in the experimentation of cryptocurrencies for remittances. Amidst the criticism against cryptocurrencies, the rise of stablecoins offers opportunities to improve cross-border payment systems, particularly remittances. Stablecoins may alleviate some of the complexities in the cross-border space. However, beyond cryptocurrencies and stablecoins, the promise of the underlying blockchain technology still holds for improving the cross-border payment systems and impact remittances cost.

The use of blockchain technology facilitates KYC procedures resulting in efficiency gains, cost reduction and improved customer experience in the process of on-boarding a customer. The use of digital identities eases the process of customer identification and cuts down cost associated with the process. In addition, blockchain technology expedites the clearing and settlement process thereby promising an efficient, traceable, safer and transparent cross-border payments system. Nonetheless, it is important to take note of the ongoing experiments and pilot projects for further evidence.

Although, blockchain technology addresses some of the shortcomings of the existing cross-border payments system, there are a few limitations. The use of blockchain technology is unlikely to eliminate or address the challenge of last-mile delivery in cash. The scarce and uneven financial coverage as well as access to bank accounts limits the potential of blockchain technology to cut down the intermediaries. Moreover, the proposed use of digital identities for KYC procedures rests on the presence of the required digital infrastructure in countries for the creation of digital identities and rule of law to avoid the data privacy risks associated with the use of digital identities. In the light of using digital identities, it is important to avoid the exigencies associated with the potential misuse of data. The challenges associated with the scalability, interoperability and maturity of technology limits the wide-scale adoption of blockchain technology for clearing and settlement.

There is a need to recognise the opportunities that stablecoins can create for cross-border payments particularly remittances, and take note of risks associated with stablecoins (if not effectively regulated). Both the public and private sector initiatives on stablecoins must address the risks and considerations associated with them to be operational. The effectiveness of these initiatives for cost reduction remains to be seen.

Blockchain technology is still young and immature. So far, as there are only a few pilot projects and small-scale projects, there is an urgent need for scalable projects and additional experimentation. The experimentation must be in conjunction with the regulators, such as the Financial Stability Board (FSB), Bank for International Settlements (BIS), G7 and G20 to promote a better understanding and shape an appropriate policy framework conducive to the deployment of digital financial services.

Like every other technology blockchain can be used for good or ill and has its own set of merits and drawbacks. Unfortunately, too often, there is a tendency to focus on the drawbacks of a new technology while taking its benefits for granted, however, in this case it might prove to be costly. Any luddite efforts to avoid the short-term cost associated with a new technology will end up denying access to its long-term benefits- which is often considered a "technology trap" (Frey, 2019[73]; The Economist, 2019[74]). Hence, for successful utilisation of the opportunities presented by blockchain technology, policy and regulation need to keep up with technological advancements and progress hand in hand. Innovators, regulators and policy makers should consult each other to develop a favourable ecosystem.

4.1. Way forward

While remittances contribute to financing development, there is a need to enhance the development impact by reducing the cost. It is important to create an enabling environment for the use and development of new technologies and business models for remittances.

- It is essential to recognise blockchain technology as a possible tool to facilitate better services. If the private sector offers new solutions to improve an existing system based on new technologies, it is crucial to ensure that these solutions are interoperable and adhere to regulatory requirements. Governments may support these developments so that companies can be at the forefront to encourage healthy competition and innovation.
- There must be political will to take risks and give room for experimentation. There is a need for additional experimentation and collaboration between policymakers and other stakeholders for a deeper understanding of blockchain technology and its implications for remittances. Regulatory sandboxes and innovation hubs could be established to foster exploration and develop appropriate regulatory framework.
- In addition to blockchain technology, mobile money and digital financial services could also be further explored for reducing the cost.
- While global stablecoins or central bank digital currencies may be one option, it needs to be ensured that people will be given the choice whether they want to pay with fiat or digital currencies to prevent a monopoly (from a public or private sector).
- Citizens must be educated about the potential risks (e.g. data privacy risks) and benefits associated with global stablecoins.
- Global principles for the financial sector and blockchain technology could be further developed to ensure consumer protection, aligned regulatory standards, minimum KYC requirements, while respecting ethical values. Recently, the OECD has formed a Blockchain Expert Policy Advisory Board (BEPAB) to provide advice on the development of high-level blockchain policy principles (OECD, 2020[75]).
- Moving forward, policy makers need to act as catalysts and help solve the international co-ordination problem of getting cross-sectoral authorities on board for shaping a favourable financial ecosystem.
- The financial inclusion agenda needs to continue and any innovation must reach and include the bottom of the pyramid for leaving no one behind.
- With a more efficient payment system in place, the resulting benefits from cost reduction of remittances (lower than 3% global average), are likely to impact positively investment, economic growth, education, health, financial inclusion, among others, thereby promoting economic development and welfare in emerging and developing economies.

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